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THIS MONTH'S COVER

The picture on the cover of the October issue of the INDUSTRIAL-ARTS MAGAZINE is a replica of the right-hand panel at the entrance to the Straus Building at Chicago, Illinois.

It depicts, in a striking manner, the union between industry and the arts.

Photo by courtesy of the S. W. Straus & Co., Chicago, Ill.

(The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," the "Loyola Educational Index," and "Current Magazine Contents.")

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THE INDUSTRIAL ARTS MAGAZINE

Volume XVII OCTOBER, 1928 No. 10

THE WISCONSIN PROGRAM OF APPRENTICE EDUCATION

Robert W. Tarbell, Milwaukee, Wis.

IT is claimed by some writers that apprenticeship has disappeared, that our modern system of industry no longer needs mechanics of the old type, that present-day methods of production are succeeding without replenishing the supply of skilled craftsmen, and that the old way of making journeymen is gone forever. Possibly this is true. The methods of manufacture which prevailed a generation ago are rapidly becoming obsolete. It is well known that the older method of hand production, which was once universal, began to disappear with the advent of the industrial revolution. It is not to be wondered at that the apprenticeship system which accompanied the old order of things should begin to crumble with it. A new idea in society may take several centuries to fully develop. Civilizations never return to the same status they held at a previous time. New customs, new discoveries, and new methods have set men to thinking that the day has at last dawned when the labor of hands is no longer needed, that machinery will henceforth work with human ingenuity, and that tradesmen are doomed to occupy a diminishing place in the world's activities.

But we must reckon with all the factors when making prophecies. The new methods of manufacture brought new possibilities to the human race. Tremendous visions were spread before the eyes of mankind. The desire for utility and mechanical service has greatly increased the demand for goods. Production is the big word in industry. This means increased facilities and more invention. With this expansion, the truth began to dawn upon people that mechanical processes are not perfect, that skilled workmen are still needed, and that some system of apprenticeship is necessary to supply the world with journeymen. The United States began to realize the significance of this situation when we reached the acute stages in the Great War. The shortage of skilled mechanics brought the lesson home very forcibly to the entire country, that some effective means must be devised to replenish the dwindling ranks of tradesmen.

There are signs that a new system of apprenticeship is growing up about us. Different states are legislating upon the matter, many industries are experimenting with systems of training, and the outlook is brightening for a new era of expert craftsmanship. Wisconsin is readily accredited with being the foremost state in the country in the matter of apprenticeship legislation and regulation. Milwaukee, as the metropolis of the state, and as a great industrial center, has developed an extensive system of apprenticeship.

Apprenticeship in Wisconsin is a definite part of the state program. It is under the supervision of the Industrial Commission of Wisconsin, which passes on the conditions of work and other regulations pertaining to the trades. The public vocational schools are usually designated as the agencies for administering the school part of the training. Various vocational schools in the state have provided instruction for apprentices since the law was passed in 1911. The Milwaukee Vocational School has conducted a department for educating apprentices since 1913. There have been changes and developments in the methods of organization and instruction, as experience has pointed to better procedure. After these years of pioneer work it is the belief that much valuable information can be assembled from the experience in Wisconsin. Other states are launching a program of apprentice education. Frequent inquiries are received in the state from educators throughout the country, for material, methods of procedure, and advice in general about apprenticeship. Much of the experience in Wisconsin will be of value to manufacturers, legislators, and school people, who are undertaking a plan of apprentice education. It is the purpose of this article to deal with several phases of the problem of apprentice education in Wisconsin.

How the Program Originated

The apprenticeship law in Wisconsin was passed in 1911. Previous to that time the system of apprentice training was very informal and rather ineffective. It is true that training was being given in a number of shops, under some agreement between the industry and the apprentice. This was a continuance of the old order of things, whereby a boy bound himself to an employer for a period of years to learn a trade. This ancient custom still exists in a slightly modified form in many industries. The arrangement between master and apprentice is still a personal one, the apprentice learning according to the private notions of his employer. There was little, if any, means for carrying boys through a period of definite training. Much useful information was withheld from the apprentice by the journeymen with whom he worked. They jealously guarded their trade secrets. As a result, the boy was handicapped as an apprentice. There are many journeymen today who can testify to the meagerness of the instruction received from the older workmen who were supposed to teach them. There was no period of schooling to provide apprentices with the essential theoretical facts pertaining to the trade. As a result there were many thinkers in the state who felt that apprenticeship was on an unsteady foundation.

The legislature of 1909 began to study the question of industrial education. The working boys and girls in the state were leaving school at the completion of the fifth grade to take jobs as they might find them. These juvenile workers were down close to the border line of illiteracy. Upon such a scant preparation the industries of the state were being built. The legislature appointed a committee to study the matter of industrial education. This committee sent the late Dr. Chas. McCarthy, of the legislative reference library, to

study the continuation schools of Europe. He spent some time abroad and made a report to the 1911 legislature. That body passed a law which created a state industrial commission, provided a system of continuation schools, and revived apprenticeship. The next move was on the part of the industrial commission, the state superintendent of schools, and the several cities. It can be said that the whole movement for an improved form of apprenticeship came about because some people with clear vision saw it as a great social need. It was inaugurated to raise the industrial efficiency of the workmen in the state and to better their condition of living.

The Legal Machinery

In order to have a system of apprenticeship supervised by the state there must be some legislation concerning it. The law must make provision for financing the program, for defining the scope of the work, and for its administration. It is one thing to have a law on the statute books, it is another thing to make it function. The apprenticeship law in Wisconsin was quite clear in its original form. It has been improved upon from time to time. It is not only a good foundation in its definitions and specifications, but functions in a dynamic way by delegating certain powers and duties to the industrial commission and to the local school boards.

Those who wish to make a study of the Wisconsin laws on apprenticeship are referred to chapter 347, sections 2377-87, laws of 1911. The laws, with succeeding changes, have been printed in pamphlet form and issued by the industrial commission at Madison. These bulletins cover the subject very well. A brief explanation of the law and how it works will now be given to show the legal mechanism behind the whole program.

There were eleven sections to the original law. They covered several different things pertaining to the definition of an indenture, length of contracts, penalties for violations, duties of the industrial commission, and articles of agreement. There were specifications as to the schoolwork, the bonus, and who should sign the contract.

With this original law as a foundation principle the newly created industrial commission started to build up a system of apprenticeship in Wisconsin. It could hardly be expected that a new state-wide program would function to the satisfaction of all, without some experimentation and some adjustments. So it was in the early days of the apprentice law. Business conditions were not favorable for employers to take on many apprentices. Some progress was made, however. An apprenticeship committee was formed among some employers to help the industrial commission in its work of administering the law.

Several changes were made in the law by succeeding legislatures. The most significant one made at the 1915 session, required the apprentices to attend school up to the age of 18 years only. Further changes were attempted in the 1917 session, but the bills which were introduced to effect the changes failed of passage, and the 1915 law remained unaltered until 1919.

It was observed during this period, in a number of cities in Wisconsin, and especially in Milwaukee, that many apprentices received but little school training under the terms of the 1915 law. The compulsory period of schooling extended to eighteen years. If boys did not become indentured until after the seventeenth birthday, there were left but a few months in which to receive the instruction offered. The law permitted apprentice contracts to be signed at the age of 16. Evidently it was the intent of the law that apprentices would thus attend school for two full years. It became apparent, however, that some apprentices were being indentured on their eighteenth birthday, or just prior to it, thus coming in contact with the vocational school very little, or not at all. This made it possible for employers, if they so wished, to delay the signing of a contract until a boy became 18, thus avoiding the school requirements. That this practice has not been common among employers of apprentices is evidenced by the fact that numerous industries in the state have sent their apprentices to the vocational school for the entire period of the indenture, even after the legal requirements have been met and, in many instances, after the apprentice has reached the age of 21 years. There were enough cases, however, where boys did not receive a fair amount of schooling because of the meager provisions of the law, to warrant a change. The legislature of 1919 changed the law so that apprentices were required to attend school during the first two years of the indenture, provided this could be accomplished before the twenty-first birthday. This was a forward step, as it insured two years at the vocational school for each apprentice, unless he began to serve time after the age of 19.

The foregoing brief statements concerning the development and administration of the apprentice law have brought us down to the legislature of 1923. Some further changes were made at that time, by which the law was put into its present form. Perhaps the chief improvement from the standpoint of the apprentice was the fact that he now receives a minimum of four hundred hours at the vocational school, on full apprentice pay, during the working hours. The law also gave rather broad powers to the industrial commission. As a result of this, the commission has prepared a set of working rules by which the program of apprenticeship should be administered. These rules are practical regulations by which the work can be done better. The commission can also make decisions on some minor points that are left open in the statutes. A standard form of indenture for apprentices has been devised, and diplomas are given to graduates upon the completion of their time.

How the Program Is Fostered

We have thus far been considering this movement as a static matter. The various phases have been considered as they exist on paper. It has been a review of the history of the movement, together with the machinery under which it is possible for the program to operate. We will now consider that the movement is in operation. There are several factors at work to make it effective. Let us consider these factors.

The industrial commission is perhaps the chief force at work to foster apprenticeship in the state. That body has made apprenticeship one of its major activities, and has appointed a supervisor and staff to administer the job. It is the immediate work of this staff to make the proper contacts with industry and place boys with employers to learn a trade. The members of this staff visit the shops, study the trades represented in them, and confer with the employers concerning the placement of boys. They also make contacts with suitable boys who are interested in learning a trade. These boys are presented to the employer, who indentures them, if they are found satisfactory. The work of inducting boys into apprenticeship is distinctly a function of the industrial commission. That body passes on the indenture, writes or approves the specifications, and virtually becomes a party to the contract. The deputy who assists in placing the boy has considerable follow-up work to do. He becomes a guidance officer to whom the apprentice may come for guidance and help concerning the problems that arise in his daily work. Wherever the deputy makes contacts, either with apprentice, employer, school, or public, he is pushing his work, selling the idea of apprenticeship up and down the state. The industrial commission maintains contact with the boy through the entire period of his indenture, and stands ready to assist him after he has become a journeyman.

The industries of the state have considerable to do in the matter of fostering apprenticeship. Without their support and cooperation the program could not be carried on. Realizing that the movement is for the good of industry, as well as for the individual, the employers have lined up behind it. They are studying its progress with an attempt to make it a real serviceable part of industry itself, and are helping to

raise the standards of apprenticeship. Students of the problem have seen for some time that apprenticeship was in a period of decline, because the trades were not attractive enough for boys. Young men did not care to learn a vocation, if they could take no pride in it. The trade must have an appeal to get boys to learn it. Employers have begun to realize this and are taking active steps to reorganize the trades in such a way that boys will take a greater professional pride in them. Industry has also found out that an apprentice is a very human individual. He has his whims, desires, doubts, and fears. He is also passing through the youthful period in his life when his mind is still plastic. Intelligent handling on the part of an employer will not only upgrade the standards of workmanship and improve the morale of the boys, but will prevent labor turnover. As a part of the program of fostering apprenticeship, the employer is instituting systems of rewards. Promotions go to the worthy. Other means of recognition are proving of value in the development of apprenticeship in the state.

The vocational school is a vital factor in fostering the program. While the apprentice attends the school for but a short part of his indentured time, still the influence of the school becomes an important matter when we consider the effect on the apprentice. The school acts as a third party in the educational program. The purely business relations that exist between employer and apprentice, are often tempered by the point of view taken by the school. The cooperation between employer and apprentice is thus made more effective. The school builds up a curriculum to instruct the boys in the theory of the trade and assists, where possible, in laying out some of the program for shop foremen. This is a necessary part of the work, without which the school end of apprenticeship would be very ineffective. Expert teaching in the vocational school is an important factor in fostering apprenticeship. Boys are quick to appreciate good teaching. Poor instruction has a harmful effect on the morale of the boys, as well as on the movement in general. The vocational schools in Wisconsin have been careful to put the apprentice classes under good teachers. The school can act in a sense as a disinterested party in the matter of fostering apprenticeship. It is apparent that it has no ax to grind, being interested in raising the educational standards and preparation of its pupils. Because of this position in the community it can make a direct, forceful attack on the problem of a more effective type of apprenticeship. It can arouse the enthusiasm of the apprentices, get them to see the value of learning a trade, cooperate with employers, win them over to better methods of procedure, and work hand in hand with the industrial commission.

The apprentices themselves are proving to be a valuable factor in fostering apprenticeship. The method they use is not only the result of what their training has done for them, but serves to illustrate how the same thing can be done in other places. If a person is satisfied with the treatment he receives, he will usually speak well of the people and the institutions serving him. Apprentices are quick to appreciate good service, both in the school and in the shop. They will speak well of the program laid out for them, if it is worth while. It is well to remember this when undertaking a program of apprenticeship. Apprentices are somewhat unconsciously aiding the program by insisting on higher standards in the craft. Those who have served a full period of apprenticeship see the shortcomings of the mechanics who have picked up parts of the trade in a hit-and-miss fashion. The apprentices feel that these others are harming the standards of workmanship in the trade by the inferior work they often do. A complete apprenticeship for all would raise the standard of efficiency and ability. Apprentices are also aiding in the program by rendering good service to their employers. This reacts on the employers, because they see the value of trained men. As boys continue to learn and do better work they are gaining supporters among the employers for an extended system of apprenticeship.

The public at large is also a factor in fostering the program. What the public thinks is a summation of these several other influences, together with ideas gathered from a variety of sources. One of the essential things that the public is gaining, as it watches apprenticeship in the state, is an intelligent understanding of the movement. It is coming to understand that an industrial society must be founded on skilled workmen. In order to have this, there must be an adequate system of apprenticeship. The second thing that the public does is an outgrowth of the first. The question of apprenticeship has come up for discussion in several sessions of the legislature. This has already been discussed. The public has backed the movement by sending men to the legislature who have improved the laws that regulate it. We thus see that apprenticeship in Wisconsin is being fostered by a number of different influences.

How the State Program Has Succeeded

It is an easy matter to say that a program has made progress. Sometimes such statements are largely matters of personal opinion. As educators, we are getting over the old notion that anything listed under the heading of education must perforce be a good thing. We are beginning to ask for objective evidence to support these statements.

There are several things that can be pointed out to indicate the development of apprenticeship in Wisconsin. One of these is the legislation that has been perfected to put apprenticeship on a more solid foundation. It has already been shown that several sessions of the legislature made changes in the law with the idea of improving the training program. These changes did not always prove to be beneficial, but the next session made still further improvements, so that the general trend has been forward. It should be recalled that there was no formal system of apprentice training in the state at the time the law was passed in 1911. Nothing was established as a precedent upon which to build for the future. The industrial commission, which was created by the same law, found itself face to face with the bare legislative act. It was necessary to devise a technic. Some mode of procedure was necessary to inaugurate so large a plan. With experience there came a more intelligent understanding of the problem and its needs. The commission has perfected its state-wide organization and has assisted in securing better legislation for apprenticeship.

The size of the movement alone is a fair indication of the growth that has taken place. It is not necessary to use statistics in detail to show the growth year by year. A recent study of apprenticeship in Milwaukee shows a steady growth in the number of employers of apprentices. In 1912 there were about a dozen employers of indentured boys. The number has increased until in 1926 there were more than one hundred employers. The variety of trades represented is a rather noticeable matter. From a few occupations—about five or six in the metal trades—the number of crafts has increased until there are apprentices in several score of trades in the city. Trade schedules have been made out in the occupations where it was believed little or no training value existed. This has proved that an intelligent understanding of the trade is of great value in developing a plan of apprenticeship.

The attitude of employers has been a commendable matter. It is hardly correct to say that industry was at first antagonistic to apprenticeship and later became favorable to it. It is better to say that industry wanted to be sure that the plan would work. Employers did not like to espouse a movement unless it gave tangible evidence of succeeding. As soon as employers began to see the benefits of the plan, their enthusiasm and support increased, until now many of them are making apprenticeship an active function of the plant. This is a healthy sign of success and points to a continuance of the work.

The attitude of the apprentices has been developing in the right direction. It is easy to see that boys in the early days knew as little or less than the employers about the purpose of the state program. To them apprenticeship was merely a job. In later years there has been a noticeable change in this respect. Also, boys with a higher grade of schooling are indenturing themselves. This means a better type of boy going into the trades.

The nationalities of apprentices show some interesting figures. While the great predominance of apprentices, especially in Milwaukee, are of German extraction, still there are many other nationalities represented. In the last few years there have been indications that several other nationalities are going into the trades in greater numbers than before. This is a healthy sign, for it means a more cosmopolitan representation in the industries of the state.

Another very important factor in the success of the apprenticeship program is the work done by the vocational schools of the state. The instructional material prepared for these boys was all new. The school faced the problem of analyzing the several trades, preparing instructional material, classifying apprentices, organizing classroom procedure and technic, and making the program effective. That it has been done with so little friction and delay speaks well for the efficiency of the vocational schools.

Conclusion

It is not claimed that the program in Wisconsin is perfect. Improvements are still possible. The foregoing discussion has aimed to show what the program is, how it has developed, how it works, and what the essential elements of success are. It is hoped that this will prove helpful to others who are facing similar problems. Much of the procedure in Wisconsin can be applied equally well in other states.

ELEMENTARY SHEET-METAL WORK

J. A. Brandt, Mooseheart Vocational School, Mooseheart, Illinois

IN presenting this list of elementary sheet-metal projects and the outline of technical information based upon them, the following statements will explain to some extent the underlying reason for their selection.

1. Students in the Mooseheart sheet-metal shop make for Mooseheart's use practically every utensil needed that can be made by hand of sheet metal.

2. Many of these utensils require the application of considerable trade knowledge and skill in their construction.

3. As many as possible of these items are made by elementary and prevocational students in the early stages of their training, thus permitting the vocational students to devote more of their time to pattern drafting and necessary, but unproductive, construction.

4. In the early stages of elementary sheet-metal work it is impractical to say definitely which students will continue in the trade, consequently, the work given the entire group is intensified, the class of work done being limited only by the individual student's ability.

5. Every effort is made to limit the technical instruction given these students to basic fundamental principles, and to assign work that will permit them to develop a reasonable degree of skill in the use of the common tools and machines, so that their training can be continued on work that will be of value to Mooseheart and which will make some return for the cost of the materials used.

6. The projects included in this course are so designed that their construction will necessitate the development of this required skill and the mastery of the necessary trade knowledge.

7. The following outline lists in detail the educational content of the problems, though in actual practice much of the technical and historical information is abridged for the elementary classes to be expanded later on for those students who select to learn the trade.

An illustration which shows the finished projects described in this course appears on page 267 of the August, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE.

Soldered Lap Seam

UNIT 1—ILLUSTRATION 1

1. Applying fractions in reading rule; correct methods of measuring and laying out.
2. The scriber or scratch awl and its use in laying out patterns on metal.
3. Block tin, its sources and use; methods of manufacturing tin plate; gauges, standard sizes, and number of sheets per case.
4. Solder, its manufacture and use.
5. Fluxes and their uses.
6. Use and care of the steel square and tinner's hand snips.
7. Gas furnaces, regulating heat and cleaning.
8. Use and care of soldering coppers.
9. Method of soldering tin plate; fluxes that may be used; soaking seams; necessity of holding metal together for soldering.
10. Cleaning soldered seams when acid flux has been used (oiling).

Note: Use of snips is stressed in this assignment. Square shears are not to be used until specified.

Soldered Lap Seam
(Galvanized Steel)

UNIT 2—ILLUSTRATION 1

1. Review the instructions contained in the preceding unit.
2. Zinc and its production.
3. Galvanized iron and steel; gauges; standard-size sheets and bundling tables.
4. Flux, to be used on galvanized metal.
5. Soldering galvanized steel.
6. Importance of soaking seams.
7. Importance of cleaning soldered seams with oily rag.

Grooved or Lock Seams

UNIT 3—ILLUSTRATION 2

1. Cost of materials used; necessity of avoiding waste; use of scrap.
2. Method of determining gauges of sheet metal by bending corners.
3. The hand groover and its use.
4. Use and care of bar folders.
5. Forming open hems or locks to fit hand groovers.
6. Closing grooved or locked seams with mallet.
7. Soaking seams with solder.
8. Cleaning soldered seams.

Riveted Seam

UNIT 4—ILLUSTRATION 3

1. Review of instructions given for previous problems.
2. Rivets; size, kinds, and cost.
3. Correct spacing for rivets on lap seams.
4. Use of center punch and prick punch in locating rivets on seam.
5. Rivet sets; size, and use.
6. Drawing rivets through metal with rivet set.
7. Heading up the rivets with a rivet set.
8. Cleaning seam.

Acid Brushes or Swabs

UNIT 5—ILLUSTRATION 4

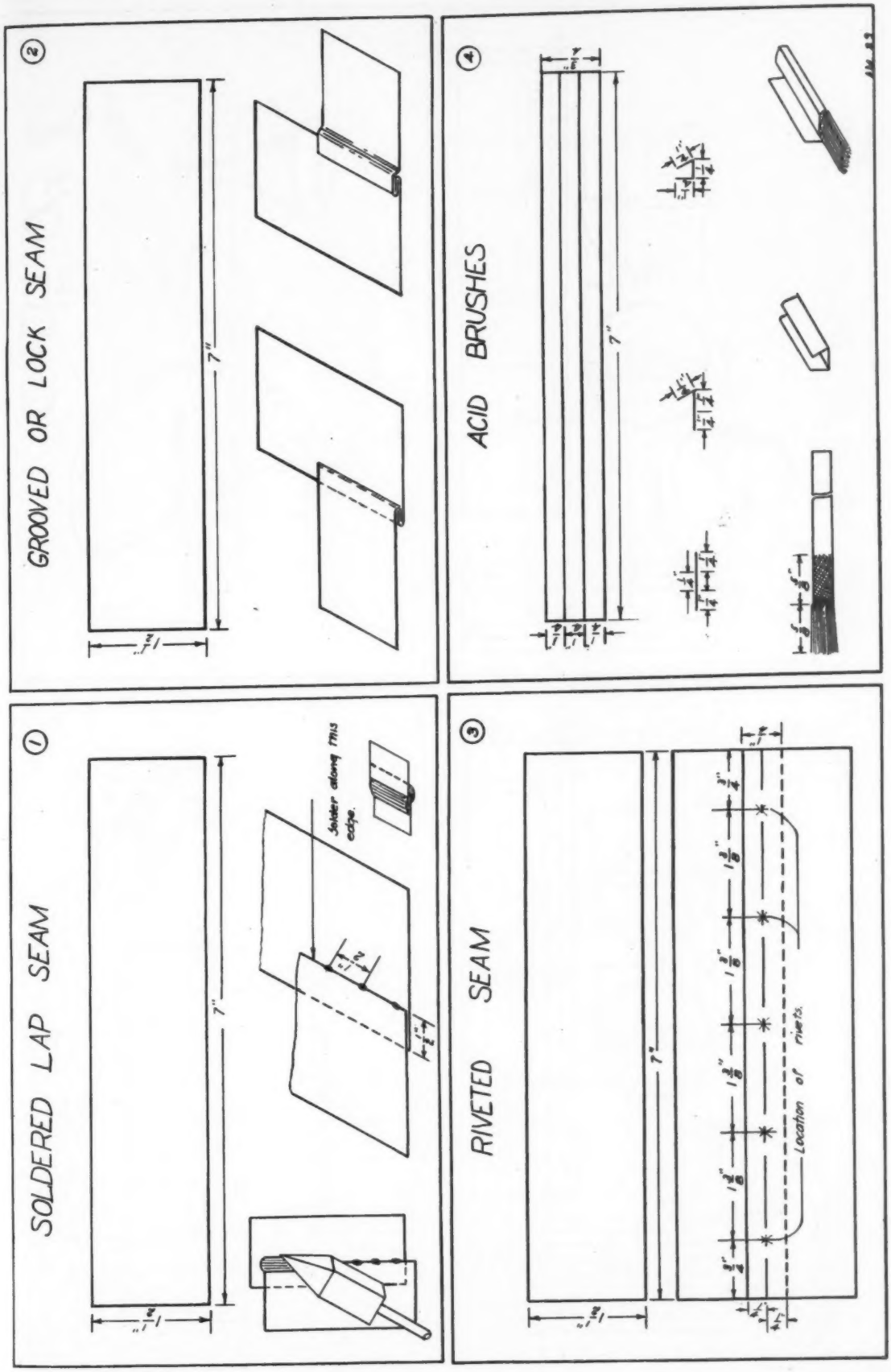
1. Necessity of securing accurate measurements in laying out work.
2. Use and care of small square shears.
3. Review of, use, and care of bar folder.
4. Closing turned edges with small brake.

This project is used to demonstrate the necessity of accurate measurements both in laying out and forming up.

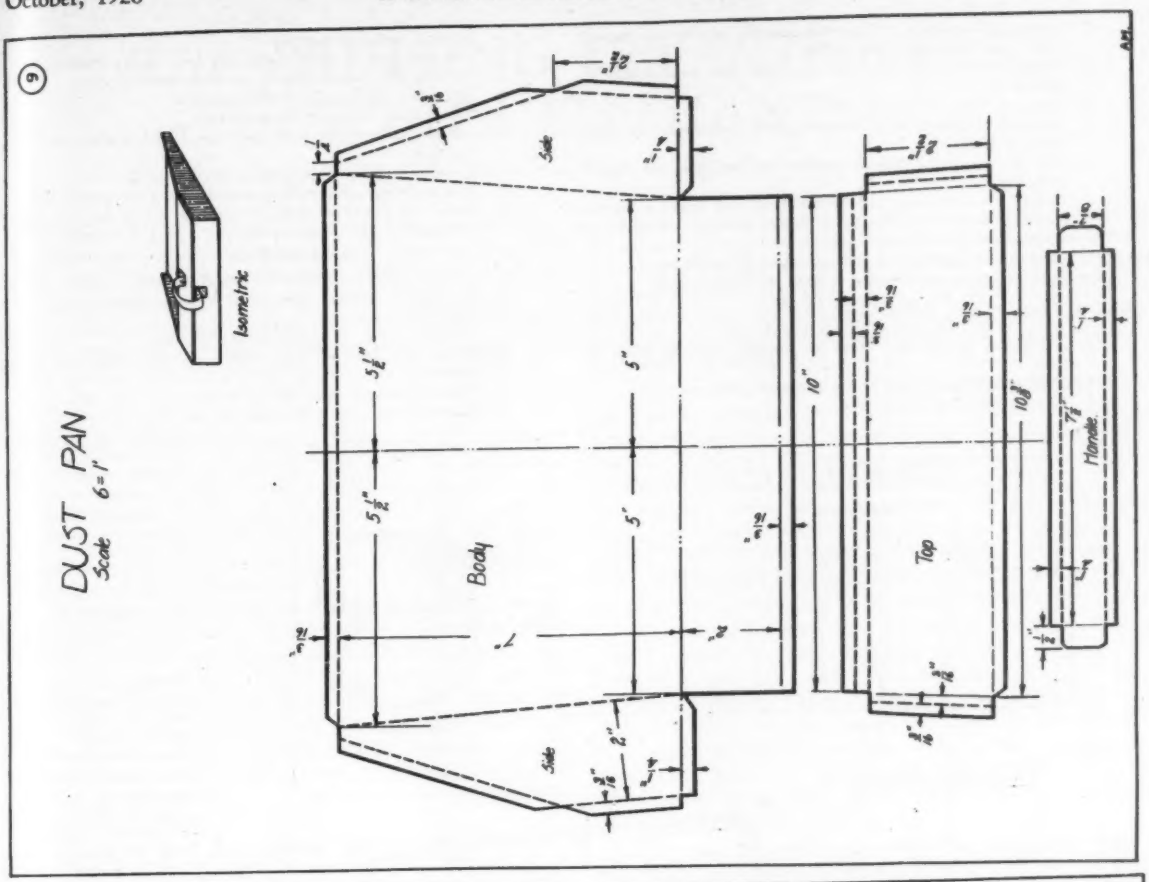
Double-Hemmed Biscuit Cutters

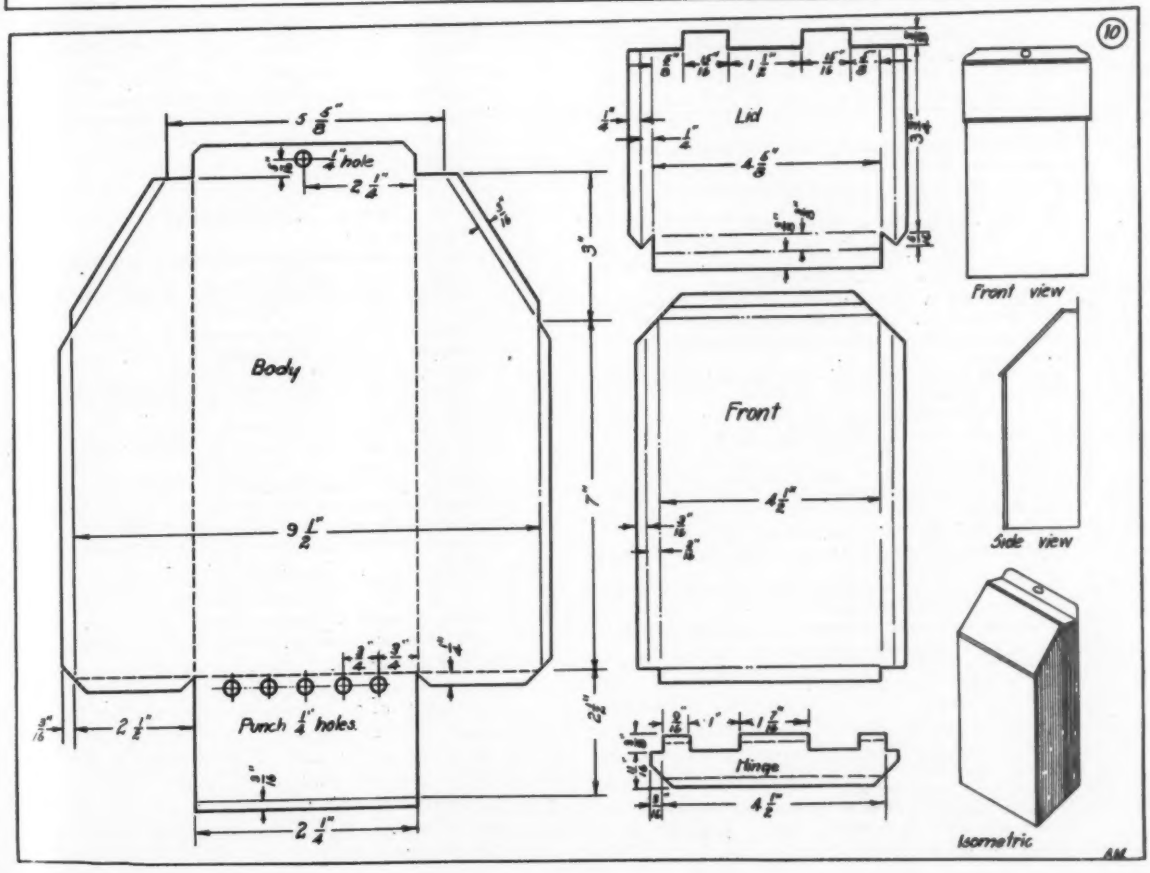
UNIT 6—ILLUSTRATION 5

1. Use and care of metal patterns.


② GROOVED OR LOCK SEAM
7"
① SOLDERED LAP SEAM
7"
Solder along this edge.
③ RIVETED SEAM
7"
Location of rivets.
④ ACID BRUSHES
7"

WIRED TOP BISCUIT CUTTER ⑥
Isometric
DOUBLE HEMMED BISCUIT CUTTER ⑤
Isometric
SMALL FUNNEL ⑧
Scale - 6"=1'
Isometric
Hopper
Spout
ONE PIECE SUPPLY BOX ⑦
Wired Top
Scale 6"=1'
Isometric


9
DUST PAN
Scale 6=1"
Isometric
Side
Body
Top
Handle
Side

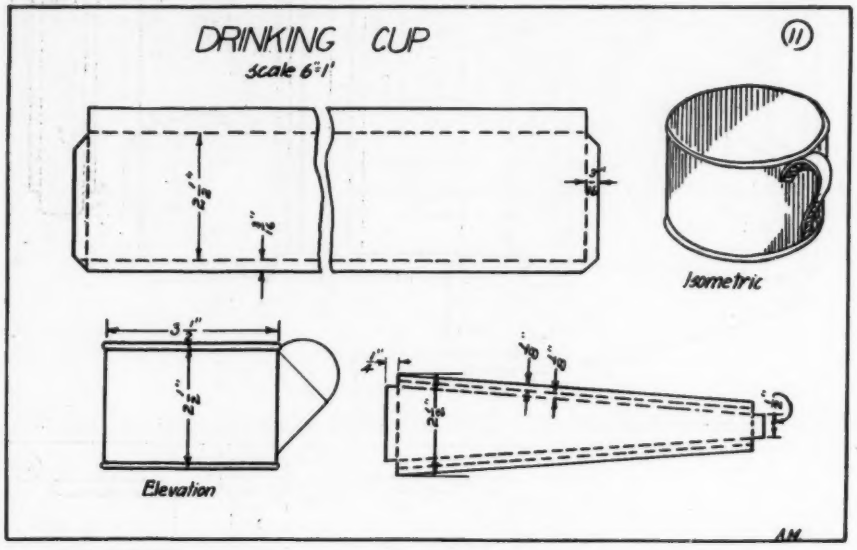

10
Lid
Front view
Body
Front
Side view
Punch 1/4" holes.
Hinge
Isometric

2. Laying out to secure the greatest possible number of required pieces from a given piece of tin.
3. Method of forming open lock, or hem and double hem on bar folder.
4. Use and care of forming rolls.
5. Stressing the necessity of correct forming and contact of edges to be soldered.
6. Use of rosin for a flux on projects that will come in contact with food.
7. Reason for hemming and double hemming edges of metal, stressing reason for leaving a round edge on hemmed or double-hemmed edges.
8. Forming and springing handle in place for soldering.
9. Spot-soldering handle tabs to body of biscuit cutter.

Wired Biscuit Cutter

UNIT 7—ILLUSTRATION 6

1. Method of setting bar folder for turning edges of metal for wire.
2. Other methods of reinforcing edges of sheet metal.
3. Wire gauges and kinds used.



4. Straightening wire in forming rolls, and with hammer.
5. Use and care of wire cutter.
6. Inclosing wire in turned edge of biscuit cutter with mallet.
7. Use and care of wiring machine.
8. Forming wired flatwork on forming rolls.

Supply Box

UNIT 8—ILLUSTRATION 7

1. Use of weights in holding patterns on metal for marking.
2. Use and reason for bending on bending lines.
3. Inside and outside of patterns on which bending lines have been drawn.
4. Method of forming edges of metal for wiring after project has been formed up.
5. Soldering tabs and their use.
6. Use and care of small cornice brake.
7. Use and care of pan former.
8. Other methods that can be used in forming end of box.
9. Necessity of having soldering tabs tight against body of box for soldering.
10. Methods of holding work for soldering.
11. Measuring formed-up work to determine length of wire required.
12. Reason why ends of wire should not be placed on seams or at corners of formed-up work.
13. Method of marking and forming wire to shape.
14. Use of square-head stake, and sizes.
15. Method of closing wire in edge of formed-up work by use of square-head stake and mallet.
16. Testing for leaks.
17. Cleaning.

Small Funnel

UNIT 9—ILLUSTRATION 8

1. Circular snips and their use.
2. Forming locks for lock seam on one-piece circular work.
3. Forming by hand on blow-horn stake.
4. Hand grooving on formed-up work.
5. Soaking seams with solder.
6. Use and care of small thick edge, or turning machine.
7. Turning edge of formed up circular work for wire.
8. Measuring for length of wire required.
9. Forming wire rings on forming rolls.
10. Inclosing wire in top of funnel hopper with mallet and wiring machine.
11. Stretching edges of formed-up circular work.
12. Spot-soldering spout to hopper and testing for correct position.
13. Review of the three methods used in wiring flat, formed-up rectangular, and circular work.

Dust Pans

UNIT 10—ILLUSTRATION 9

1. Necessity of placing patterns to prevent waste.
2. Notching.
3. Common seams used in sheet-metal work.
4. Reason for hem on raw edges; forming edges for double seaming.
5. Forming body of dust pan on brake.
6. Reason for placing solder tabs on the inside of body.
7. Closing and preparing double seams on brake.
8. Closing double seams with mallet on stake.
9. Wiring handle and method of bending to shape.
10. Locating and soldering handle.

Mail Box

UNIT 11—ILLUSTRATION 10

1. Review of correct method of placing patterns on sheet metal to prevent waste.
2. Review of galvanized steel; gauges; method of determining thickness or gauge by bending corner of sheet or scrap.
3. Use of bending points in place of bending lines and prick-punching for hole locations.
4. Wire chisels.
5. Cutting inside notches for hinge.
6. Use and care of bench punch.
7. Making hinges.
8. Holding difficult work for soldering.

Tin Cup

UNIT 12—ILLUSTRATION 11

1. Wiring top edge.
2. Applying instructions based on funnel in preparing ends for locked seam and grooving.
3. Applying instructions based on wired biscuit cutter in wiring top edge of cup.
4. Use and care of small burring machine.
5. Flanging on small burring machine.
6. Method of measuring for cup bottom.
7. Allowance to be made when cutting squares for bottom circles.
8. Use and care of circular shears (machine).
9. Method of using small burring machine in preparing bottom for double seaming on body of cup.
10. Setting, and riveting hammers.
11. Snapping bottom on body of cup.
12. Closing bottom on body with setting hammer.
13. Double seaming circular work on pipe or double-seaming stake.
14. Dressing double-seamed edges of circular work.
15. Necessity of soaking seams with solder.
16. Forming handle on stake.
17. Soldering handle to cup; reason for tabs on handle.
18. Testing for leaks.

Practical-Arts Instruction

The purpose of all practical-arts instruction is to give an appreciative understanding of tools, materials, processes, and design as found in the work of the world. It should give information about the lives of the people concerned, about their transportation, their manufactures, and their beautification and utilization. All of the instruction should be given from the consumer's point of view.—*F. T. Struck.*

THE PRINTING DEPARTMENT'S WHITE ELEPHANT

Harley H. Goodwin, Manhattan High School, Manhattan, Kans.

ENCROACHING upon the instructional time of the high-school printing department more and more each year, the school annual has become a veritable "white elephant." Unlike the circus man, or the Oriental, the printing instructor has been unable to tame and harness this unruly beast and make it serve some good purpose. The slogan of "a bigger and better annual" adopted by each year's annual staff has furnished the nourishment for the phenomenal growth of this unwelcome beast.

To the uninitiated, the annual is supposed to furnish for the printing classes, "something different," "a worth-while project, superior to lesson and instructional material." The initiated, however, know that the course of study with its sequence of problems and projects is thrown into the discard in order that all efforts and energies of the printing classes can be devoted to this publication.

The value of the annual as a purely instructional project to be handled in the school shop, is small. There are phases of the book which are a valuable adjunct to the course. Thus, the opening pages, the title, foreword, dedication, and the senior section, furnish worth-while experiences. Making up pages which involve the use of cuts, offers splendid opportunity for considerable practice. Outside of these features, however, very little worth-while experience can be gained, except that more speed and accuracy in composition and presswork may probably be developed.

The majority of the students, after working on an outlined course of study, begin to slow up when put on a job like the annual. Their complaints concerning so much work of the same kind is quite justified. Their inclination and desire is to be back on their regular course of work. They feel that they are being exploited in order to furnish a piece of work beyond their ability, and for a group that does not have the interest of the printing department at heart. This feeling among the students is especially noticeable after they have visited a few commercial shops where they could observe what equipment is really required to handle such publication jobs.

Then, too, the majority of high schools do not offer a sufficient amount of printing, to enable the students to handle this kind of work efficiently. Any boy who is required to perform the same process for long periods of time, becomes disinterested, and his productivity naturally is decreased. A few boys may become good slip-sheeters, and press feeders, after having worked on the annual, but they will not have learned much else. Such procedure is contrary to good teaching practice.

The equipment necessary for producing annuals such as are printed now, is not found in the average high-school printshop. Actual processes followed in commercial shops are impossible, hence makeshifts are devised in order that the work may be completed. The installation of cylinder presses, typecasting machines, and other expensive equipment, in order to handle the annual properly, is out of the question for the average high school. This is especially true where no attempt is made to do vocational work. If such equipment were installed, it would be idle 60 per cent of the time.

It does not seem fair and honest to induce students to enroll in a printing course, and then ask them to work on the annual almost half of the time they spend in the shop. This is no different than asking the woodworking department to produce quantities of desks, tables, and the like for the school system. The experiences of many schools attempting this factory method of instruction has shown that the courses deteriorate to such an extent that the work must be greatly curtailed or entirely discontinued. History repeats itself, and printing will share the same fate if this exploitation continues. Exceptions may be made in strictly trade and vocational schools, where the aim is somewhat different than in the ordinary junior or senior high school.

Then, too, the annual places too much responsibility upon the printing instructor, for it is he who must devise ways and means to make his equipment do the best possible work. Besides all this, the job must be rushed all the time in order to have the book ready by the end of the school year. Usually this requires considerable overtime work. As high as two hundred hours of overtime have been spent by an instructor on the annual, usually without extra pay. In addition, he is expected, with his inexperienced student help, to produce a book which equals similar jobs printed by commercial shops.

The annual has become such a burden to the school shop largely because this year's staff has the desire to do a little better than last year's staff. Or, the annual is to be bigger and more elaborate than that of the school in a neighboring city. Probably, too, the annual staff has seen some feature in a large high school or college annual which they want to incorporate into their book. This striving for something newer or larger, or better, is the reason why the annual has gradually grown out of bounds.

The cost of printing an annual in the school shop is considerably less, than if it were printed in a commercial shop, because the school board pays the teacher's salary, and furnishes the equipment. This leaves only the cost of the paper, ink, and engravings to be borne by the staff. They are, therefore, enabled to spend more money on a larger book. Then there is the contest craze, the desire to win a cup in the national contest. This urges the staff to further heights of indiscretion and burdens the shop with more elaborate production. The fact that the engraving companies push their wares harder and harder each year, attempting to sell color work, borders, division pages, etc., and their offer of free service in planning books, contributes still more to the burden.

All these factors taken together have brought the annual to the present status of being such a "white elephant."

Occasionally a superintendent or principal is found who, in his desire to push his school to the front, or to do something a little different, proceeds something like one man planned to do in Kansas. He contemplated the installation of an $800 printing plant in his small school for the primary purpose of getting out an annual. He intended to have his manual-training instructor, a man who had no printing experience, to look after the work along with his other duties. When asked why he wanted to do all this, he said, "We cannot afford to get an annual any other way, and we have wanted one for years." Such individuals are few and far between, but they exist, and the occurrence shows the extremes that will be attempted in order to have an annual.

As long as there are annuals, they will be printed in the school shops, so that the problem of handling them with the least amount of interference to the regular routine, is one of the printing instructor's problems. One way to accomplish the job, is to make the annual conform to the ability of the shop to produce a creditable piece of work, with the least amount of outside effort, and to reduce the actual labor performed by the students to the minimum.

The procedure adopted in the Manhattan High School seems to go a long way toward solving this perplexing problem. The method adopted by this school is as follows:

The printing instructor is allowed to sponsor the book, because, then, the staff can be more easily guided in achieving the desired results. Knowing the limitations of the printshop, he can fit the work into the course and class routine more easily than when some other member of the faculty has charge of the book.

In order to limit the cost of the annual to the very minimum, the number of pages are first determined. This year's annual will have 104 pages, but these will contain the same amount of material and engravings as previous books of 120 to 144 pages. Laying out the dummy at the beginning of the year, makes it possible to cover the desired features and departments in the best possible way.

It is more advisable to have the bulk of composition machine-set by a commercial printer, rather than have it hand-set by the students. The amount of instructional time required in hand-setting an entire annual, leaves practically no class time for the regular work. This has been the big bugbear in the past. Having most of the material machine-set still leaves sufficient composition on the annual for hand-setting to give the desired insight into the various features of book make-up. The opening pages are usually set by hand. All students in the advanced classes are invited to enter a contest in setting this material. The best work is then chosen to be used in the book.

Presswork is reduced by leaving off the extra color used for the border. The layout of the book was so made that the border was not necessary to make each page appear as a single unit. Then, too, all pages were required to be entirely filled with type matter. This was accomplished by having all the copy written in story form, rather than in outline.

The omitting of the extra color is a very great timesaver when the annual is printed on the platen press, and very little overtime work was required to complete the presswork. Where a cylinder press is available the labor involved is still more simplified. However, in either case there is too much time lost in the make-ready, because the instructor is not able to give his undivided attention to the work, and the average student is not capable of getting the best results because of his inexperience.

A pressman was, therefore, employed to handle the make-ready and to supervise the presswork on the signatures. There was less interference with other instructional work, than during any other year. The students handled all imposition work, and several of those who were more advanced worked on the make-ready under the direction of the pressman. Three weeks was sufficient time to print the annual in this manner.

Instead of spending a large sum for a board cover, cover paper was used. The stitching and gluing on of the cover was done by the students and members of the annual staff. The money thus saved was used to pay for the pressman's time.

In retrospect, this procedure seems to be the effective solution of the perplexing problem of publishing the annual in a typical high-school printshop. The students showed more interest in the work than they did in former years, and they gained an equal amount of training and experience under a more efficient system. Besides this, there were few hours of overtime. The instructor was not under the heavy burden of attempting to conduct a class, and act as general foreman and pressman at the same time.

It seems as though the "white elephant" has been tamed and harnessed to serve some good purpose, at last. The danger of its immediate demise is past, and it will likely serve its masters for some time to come.

HOUSE BUILDING AS VOCATIONAL-TRAINING EXPERIENCE

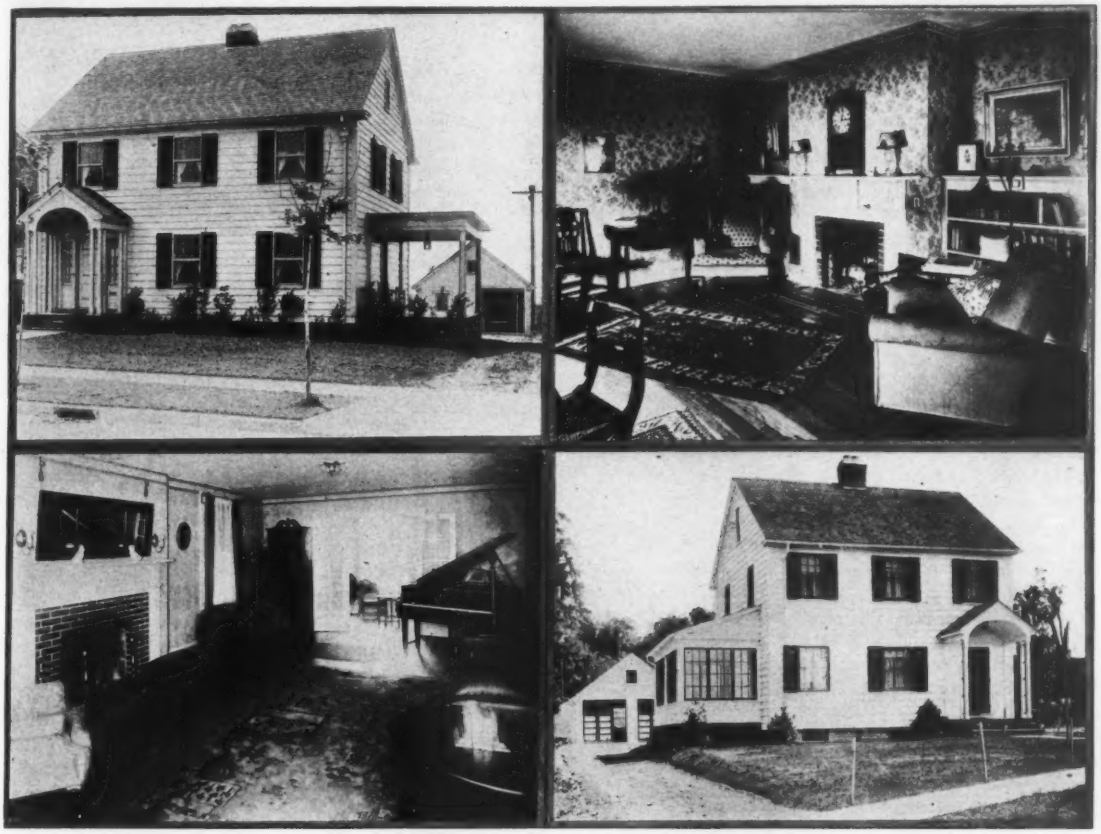
Verne A. Bird, Director of Education, Mooseheart, Ill., Formerly Assistant Superintendent of Schools, Utica, N. Y.

TO prepare the boy for entrance upon the work of a specific recognized gainful occupation with the requisite equipment in knowledge and training to make his labor immediately profitable to the employer and to insure reasonable progress and achievement within the field of employment, has long been the stipulated general objective of those who have been interested in the development of the program of secondary industrial and technical education. In the achievement of this objective, curricula and methods of instruction have pointed directly toward: (1) the development of definite manipulative skills of such character as to make possible the carrying on of the fundamental processes of the trade, or the industrial or technical pursuit, with reasonable speed and accuracy; (2) the imparting of such functioning knowledge as would enable the worker to solve the technical problems which arise in connection with the employment; (3) the development of the ability to select functioning facts, evaluate them and bring them to bear directly upon the solution of practical problems. Obviously, then, the degree to which the principal objective has been achieved has been conditioned quite largely upon the extent to which *actual, typical, occupational experiences have been provided.* Some of the most difficult problems in the field of vocational education have arisen out of this fact, problems which have greatly limited the extension of the program.

The building trades as a group, while presenting a fine field for vocational training when considered from the viewpoint of training needs, have presented one of the most difficult problems from the viewpoint of providing actual trade experiences as a part of the training program. It was for the purpose of meeting these problems in the best way possible that the house-building program was undertaken in connection with the building-trades courses at Utica, New York. It is not our claim that we have done anything unique, extraordinary, or revolutionary, but we do think that we have done a good training job and have had some experiences which may be helpful to others.

Our house-building program was started in Utica six years ago and one residence has been completed each year during that time. Our first venture was a small Dutch-Colonial type of house upon which the boys did the carpentry work, the electrical work, the masonry and concrete work, and the painting. The job was financed through a local bank by the assistant superintendent of schools, the plan being to sell the house immediately upon completion, and then to take care of the bank loan. But it did not work out that way. There was extreme prejudice against the job due to the fact that it was "boy built." No good offer was received for the house for a period of two years, during which time the carrying charges were, of course, mounting. It was finally sold at a considerable loss. But the director had faith in the plan, and although the first job was still unsold, went right ahead with the second project on the same plan. This worked out

somewhat better. The second job was a two-family house, and sold immediately for $10,300, but still there was a small deficit. It was then evident that our plan of financing was wrong, at least until such time as we could overcome popular prejudice against our work. Our next plan was to build for a certain individual who would be willing to furnish the lot, buy all materials, let all contracts for work which we were not in a position to do, and then pay us 5-per-cent profit on the total cost of the job, exclusive of the lot. This plan worked very satisfactorily, and there was not the slightest difficulty in securing contracts upon that basis. Each succeeding year a little more difficult job was undertaken, the last one completed being a Colonial design, 30 by 40 ft., erected upon a $7,000 lot and located in one of the finest sections of the city. During the present year an English-type brick veneer is being erected. This will be the finest job yet undertaken.



EXTERIORS AND INTERIORS OF HOUSES BUILT BY VOCATIONAL STUDENTS AT UTICA, N. Y.

The essential features of the contract between the owner and the director of vocational education under the present plan are as follows: All plans and specifications are to be prepared by the architectural-drafting department of the Utica Free Academy and then approved by the owner; all materials are to be purchased by the owner; all contracts for labor not to be performed by the boys are to be let by the owner; all labor on the job not done by students is to be done by union labor and all contracts are to be let to firms considered "fair" by organized labor; all carpentry work which is customarily done on a house job is to be done by the vocational boys; all brick and masonry work is to be done by the vocational boys; all electrical work is to be done by the vocational boys and shall be inspected and approved by the fire underwriters; such other work is to be done by students in training which has direct training value in relation to the vocation for which they are preparing; the job is to be carried on under the constant supervision of the head of the department of architectural drafting and the head of the department of building construction; fuel is to be furnished by the owner for inside work during the winter months; a fee equal to 5 per cent of the total cost of the job (exclusive of the lot), is to be paid to the director of vocational education upon the satisfactory completion of the work.

The one question most frequently asked is: How do you get past the labor unions? And the answer is that we do not attempt to get past them; they come along with us. Organized labor was cooperative in every way possible on the job.

Another question often asked is: Do the boys really do the work? To which we can answer unequivocally, they do. On the entire job there had been but very few hours of manipulative work carried on by the instructors, and this always in the nature of a teaching demonstration.

At the close of each year, when the building project was finished, the homemaking departments of the schools, in cooperation with local merchants and the National Better Homes Bureau, have furnished the "boy-built" house completely and kept it open for one week as a demonstration house. This practice has proved highly profitable not only as a worth-while community project in the interest of better housing and home furnishing, but from the viewpoint of creating community interest in the work of the schools, and in particular in the practical phases of schoolwork.

To cultivate the creative habit, with its recognition of a possible ideal in every set of conditions, a sane understanding of the place of beauty in all production past and present, is to produce a tonic which should keep up every portion of the educational fabric.—*Walter Sargent.*

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

A PERSONAL QUESTION

Are you reading your professional magazines? As shop teacher, you may think it is not necessary to do so, but can you neglect it without endangering your future? Many of your fellow teachers are not letting any opportunities for improving themselves escape them. They read about what other teachers are doing, and how they are doing it. They keep abreast of the newer methods of testing, they follow the experiments that are being tried out at this or that school, they add to their available supply of projects for their shops by clipping those presented in their professional magazines, thus keeping the matter which they present to their students in a constant state of flux and always up to date. They become acquainted with the best thoughts of those on whom rests the arduous duty of preparing future teachers. In other words, they know of all of the activities that are going on in their field of activity. Naturally, such a teacher is ready for promotion at any time because he is prepared. He does not only have a philosophy of his own about the industrial arts, but he also is acquainted with the ideas proposed by others. He can make comparisons and state reasons for accepting one statement or set of statements, and rejecting others.

Again, are you reading your professional magazines?

If you are not, remember that you are in direct competition with those of your fellow teachers who do. Remember also, that your advance in your chosen field depends upon your ready knowledge of what the thinkers in that field are proposing and doing. Remember also, that in order to have your information ready at all times, you must have it organized so that it is accessible. That means that you must have your own copies of your professional magazines so that you can clip them or file them to suit yourself. A library copy of this or that magazine will not suffice; you are not permitted to clip library copies.

It is only by keeping abreast with what the other fellow is doing that you can be fully informed with the constantly developing field of the industrial arts.

Are you reading your professional magazines?

THE NEW TEACHER AND THE NEW POSITION

Many thousands of teachers are facing the trying and difficult task of assuming new positions this fall. A great number of them are holding teaching positions for the first time, while the others have, for one reason or another, changed their positions. In either case, the task is a difficult one and requires the greatest tact, patience, and wisdom.

Any community has a right to assume proper and adequate preparation on the part of any teacher whom the local authorities may have employed. For the average teacher who goes into a new position this fall, the difficulties and pressing problems will not arise because of his preparation, his courses, methods, and theories. His success or failure will very largely depend upon his personality; his personal fitness; his manner of meeting the pupils, the other teachers, and the public; his attitude toward his predecessor and his work; his attitude toward those who occupy positions of supervision and authority over him; and his tact and fairness and agreeableness in dealing with the situations arising out of these more or less personal relations.

This being true, the following cautions may be of value to any teacher who will reflect on them, and who will reestimate his qualifications in the light of their suggestions.

1. Assume that those who employ you know what they are doing and what they want you to do.
2. Do not reveal too soon wherein your theories differ from those of your supervisor and predecessor.
3. Do not under any circumstances allow yourself to be drawn into a discussion and a criticism of the merits of your predecessor and his work.
4. Be absolutely loyal to your superiors in authority. If you cannot conscientiously serve *loyally*, then by all means relinquish your position.
5. Try, in a natural way, and on the basis of mutual interest, to win the respect and friendship of your pupils the first time you meet them. On this point you will win or lose at the first meeting.
6. Insofar as is humanly possible, make no radical changes at first. Let necessary changes come gradually and after the need for them has become apparent to those with whom you work.
7. Put your life into your work.
8. Do not grumble and complain about insufficient and inferior equipment. Use what you have to the utmost of your ability and its capacity. That's the way to get additional and better equipment.
9. Take an interest in every worthy enterprise that affects your community and the lives of your pupils.
10. Do not talk about either the superiority or the inferiority of your previous position or the "better offers" you have had. People do not believe such talk. *Never pose as a martyr no matter what the facts in the case may be.*
11. Mix; get acquainted. You may like the people just as much as they like you.
12. Don't be a boss or an autocrat. Be a coworker with every teacher, pupil, and patron.
13. Go in to succeed, to accomplish a definite end, to make good, and you *will*.
14. Aim to be skillful in instruction, affable and kindly in manner, patient under provocation, frugal of time and materials, tolerant of others' opinions, and tireless in your industry.

If you heed these suggestions, promotion and community esteem will be headed your way before you suspect it.

PIONEERS

Great changes have occurred during the past quarter of a century in the personnel of the teaching force in the field of the industrial arts. In the early days, very few teachers of this work had any specific training for their tasks. Some, to be sure, came from the technological schools, but technological schools in those days were different. In the early days also, there were but few books and those books now make very odd reading.

It is easy to see, therefore, how completely the first teachers of manual training were thrown on their own resources. They had to do their own thinking, their own planning, their own equipping, their own fighting, for in those days every inch of the way had to be fought for the new type of education. Those teachers were essentially pioneers with the pioneer vision and courage and enthusiasm. To them manual training was a *cause* and they enlisted in its service for the duration of the conflict.

It is extremely interesting to those who still have personal recollections of these pioneers to call the roll and reflect on the type of men they were and their devotion to the movement. Some of them are yet carrying on, and understudies of theirs are still leading the cause. To those who are familiar with the history of manual and industrial arts, the following list

of names is a significant one: Woodward, Belfield, Richards, Bennett, Harvey, Roberts, Griffith, Brace, Abbott, Painter, Ball, Dean, Johnson, Clauser, Leavitt, Cooley, Selvidge, Prosser Bogan, Bauersfeld, Christy. These names suggest a host of others. These men and others of their kind will probably never have their proper places in educational history, because for the most part, the men who write educational history have never been particularly friendly to this new type of education. But how richly these pioneers deserve esteem and gratitude!

Occasionally, men came into this new work from the carpenter's bench and other trades, not because they were prepared to teach, but because they were good mechanics and intelligent, progressive men who sensed the need of this new force in education. What they lacked in education and instructional skill they made up in their zeal, their industry, their courage, and their dogged determination to succeed. They brought a needed element into the enterprise, and they made a lasting contribution to the cause.

The present generation of teachers, with their college training and their special preparation, may well reflect on what made great teachers out of some of these men who had no college training,, and what still keeps some of them in important positions of leadership. May the better training, better positions, better pay, and the better buildings and equipment not dull the ardor, dampen the enthusiasm, nor lessen the energy and zeal of this new generation of teachers! May they light their torches from those of the worthy pioneers! The future of the work absolutely depends upon keeping aflame the enthusiasm and the spirit of the pioneers in this great field.

APPLICATION

Boys, in school-shop classes, who will soon become a part of the industrial world, are getting a foundation in applying themselves or in "killing time."

The wise shop instructor has a check for accuracy and time on each job done by the boy. Each job is graded, and the boy is allowed to see his grade. There is no question on card day as to why a low grade was given. The guesswork on the part of the instructor is missing; the boy is aware that time counts, that his actual work is carefully recorded, that he is in the shop to apply himself; and that he is getting the right kind of training to fit him for the industrial field which he is to enter in the not distant future.

How often do we see the other side of the picture? The boys are conscious that no exact record of accomplishment is on file, the lazy attitude that tomorrow is another day to finish this job is apparent, the youthful eyes are on the clock, or the boys clean up early so that they may take a swim before the next class starts. The boys are in the attitude that the school shop is a place for amusement instead of work.

The two shops described are with us and the boys from these shops are turned out every year. Industry must reluctantly make over many school products, but it greets the properly trained boy with open arms.

Which kind of a shop are you running?

GRADING

Grading of students in school subjects is a matter which will stand much investigation. Opinion is divided as to the proper system to use and upon what to base the passing grade.

The administrator views with alarm the idea of any retardation to add to the already heavy educational expense. He holds the attitude, too often, that failure is to be laid at the door of the teacher and not to the pupil. He is in a position to make comparisons with other teachers but he cannot always judge the type of pupils or other situations which affect the classroom work.

The teacher soon learns that it is not merit which is to be rewarded but that he is expected to give each pupil a passing grade. He is mindful that many of his pupils should perhaps be placed in a lower grade. He is cautious of passing his innermost convictions, less he be expelled from the system. He gradually fits into the situation, because a part of a vicious machine of promotion for promotion's sake, and lets his conscientious nature dwindle with each passing year.

The pupil, especially in the upper grades, senses the situation and unless he be a born student "gets by" as easy as possible.

In the meantime the parent foots the bill, little realizing the injustice of a system which pushes children ahead with the motto, "Take them where you find them and leave them a little better off for the contact they have had with you." Instead of setting up definite attainments and strictly adhering to these requirements for a passing grade, the belief that time spent in a school should suffice, is often the case.

Unless standards are maintained and our school system so managed that the pupil is rewarded on merit, regardless of failures, we are headed backward. When we educate so as to emphasize the very traits which we now ignore—application, sincerity, desire for knowledge, and honesty—we will be on a fair road to success. It is not necessarily success to have an increased school enrollment and added educational facilities. It is success, however, to uphold certain standards of student attainment in personal traits and subject matter, even though the school system seems to shrink.

ANY FOOL OUGHT TO KNOW

Laurence Parker, Kansas State Teachers College, Pittsburg, Kansas

A Kansan was traveling through the hills of Maine in his mud-incrusted flivver headed for Bangor. He followed the signs with a feeling of perfect security until he came to the top of a long hill where he found a sign that pointed the way to Bangor in the direction from which he had come. This halted him and he waited for Old Timer to come up the hill and give him real information. Old Timer said, "Go straight ahead to Bangor."

"Then why does the sign point the other way?" said the Kansan.

"Well, you see, after we got the sign painted with the hand and everything, we found that there was too much rock on the right-hand side of the road to erect the guide post. The boys decided therefore, to put it on the left-hand side of the road where the digging was easier."

"But," said the amazed Kansan, "Aren't you afraid you will cause trouble for the tourists along this road?"

"O, I guess not," said Old Timer, "Any fool ought to know the road to Bangor."

Greetings to you new manual-training men just come on the job in "Little Burg." You are busy these days checking tools and supplies and getting ready for the big day of enrollment and the time when you shall become acquainted with the boys who are to fill your shop hour after hour throughout the week. It is quite a job getting all of the boys to work upon something which will satisfy the boy, the parent, the school authorities, and yourself.

You found most of the tools and part of the materials that you need, but did your predecessor leave for you any signboards which would point you on your way to the destination of the manual-training work of "Little Burg?" Was there a well-worked-out plan, a road map with frequent roadside markings? Or did he feel that "Any fool ought to know the road to Bangor." How much it would lighten your load of thought and care if you had a road map and set of road signs just now.

In a few years from now you will leave the job at "Little Burg" and go to the bigger field at "Big Burg." What will you do between now and that time? If you are a "regular fellow" you will mark the road you are traveling so that the next fellow as he takes over your shop and its tools and materials will have no trouble in finding "the right road to Bangor."

FOUNDRY PRACTICE IN HIGH SCHOOL

A. H. Luehring, State Normal School, Terre Haute, Ind.

THE purpose of this article is to show the value and explain the method of introducing foundry practice into a high school. It may also help the high-school teacher who is desirous of developing a woodworking course into a general shop course.

Foundry practice, as defined by Richards, "consists of the making of sand molds and filling them with molten metal to form castings." There are many branches of foundry practice, such as the making of molds for gray iron, aluminum, brass, steel, and malleable castings.

Foundry work is a growing industry in all its branches. The forming of irregularly shaped metal pieces can be done best and with least expense by the molding process, and this has led to the extensive development of the industry. The introduction of malleable iron into the field of cast metals has resulted in the substitution of such castings for many forgings. The steel-casting business was slow in developing because of the difficult problems that it presented, but now it is rapidly progressing. The casting of aluminum pieces is growing by leaps and bounds.

This development naturally results in the employment of more and more workers and hence more and more high-school boys will accept employment in some phase of the molding industry. Directors and teachers of industrial arts are, therefore, justified in taking these facts into consideration and in planning their courses accordingly.

The branch of foundry practice which is most adaptable to high-school conditions is aluminum molding and possibly brass molding. This can be carried on in a corner of a typical high-school woodworking shop in which about 10 sq. ft. of floor space is available.

The equipment and supplies required are as follows:

Equipment	*How Secured*	*Where Secured*	*Estimated Cost*
Molding bin	Homemade		$ 15.00
12 by 12-in. flasks	Homemade		.75
Molding boards	Homemade		.15
Strike off	Homemade		.00
Draw spike	Homemade	Scrap yard	.00
Rapping bar	Homemade	Scrap yard	.00
Gate cutter	Homemade	Piece of tin	.00
Vent rod	Homemade	Piece of wire	.00
Rammer	Homemade		.25
Trowel	Purchased	Foundry supply co.	.60
Spoon slick	Purchased	Ten cent store (a common teaspoon)	.02
Sponge	Purchased	Drug store	.10
Lifter	Purchased	Foundry supply co.	.50
Sand	Purchased or donated	Local foundry or Sand pit	per yd. 2.00
Scrap aluminum	Purchased	Garage man or Junk dealer	lb. .20
Scrap brass	Purchased	Junk dealer	lb. .06
Gasoline furnace	Purchased	Hardware dealer	8.50
Gas furnace	Purchased		200.00
Asbestos leggings	Purchased	Foundry supply	2.00
Goggles	Purchased	Ten cent store	.10
Crucibles	Purchased	Foundry supply	2.00
Crucible tongs	Homemade		2.50

If the floor of the shop is of wood, it will be best to lay down a frame of 2 by 4's and fill this with common clay moistened and tamped down hard. The molds and furnace can be set on this floor, thus eliminating danger of fire due to spilled metal.

Perhaps it will be well to explain briefly how the metal may be melted most conveniently under high-school conditions.

The ordinary coke-fired brass furnace set in the floor is not satisfactory because it is too slow and requires too much attention. If gas is available, it is advisable to use gas because by this method the melting can be done in less time and with less attention than by any other method. There are several very good gas furnaces on the market in which both brass and aluminum may be melted. If gas is not available, and a blacksmith's forge is handy, this may be used. In this case it will be necessary to make a hood to fit around the crucible in which the metal is melted. A fire-brick cover will also be required to conserve the heat. Figure 1 shows one that was made and used by students of the Indiana State Normal School at Terre Haute. It is made of ten-gauge sheet iron bent into a cylinder. This may be done without heating the iron. The ends are lapped and riveted. It is then lined with fire brick which is held in place by means of mortar made of a one-to-one mixture of fire clay and sharp sand. An angle-iron ring may be riveted into one end of the cylinder to support the fire brick. The inside diameter of the hood should be 6 or 8 in. larger than the outside diameter of the crucible in order that coke may be packed around it. The hood should also be about 6 or 8 in. higher than the crucible in

FIG. 3

order that the crucible may rest on 6 or 8 in. of burning coke. The cover is made of fire brick set in an angle-iron frame. The spaces between the bricks are filled with the same mixture used in the hood lining.

Another method, and perhaps the best one for a rural school in which neither gas nor a forge is available, is to use a gasoline furnace. A good plumber's melting furnace, using gasoline, may be purchased for $8.50. The standard-size pot that is usually furnished with this furnace is too small but a large-size pot may be secured. In this case it will be necessary to make a hood and cover similar to the one just described. In designing this hood, however, no allowance need be made for coke. The hood should fit the pot more closely, thus confining the heat in a smaller space. It will not be necessary to use fire brick to line it with. A mixture of one-to-one fire clay and sharp sand laid in about 1 in. thick is sufficient. Figure 2 shows one that was made and used by students. By this method eleven pounds of automobile scrap aluminum was melted in one hour and ten minutes, consuming about three pints of gasoline.

Securing patterns is not a difficult task. It is one of the most valuable features of a course of this kind. Many articles such as book ends, pin trays, cooking utensils, glassware and celluloid articles, candlesticks, paper knives, emblems, name plates, automobile accessories, and others have been used as patterns. They are found in every home, office, shop, hardware store, and ten cent store. The value comes in requiring the pupils to find them and then to smooth them so that they may be used as patterns. The pupils will thus become familiar with many patternmaking principles. It will also awaken in them a desire to know how these articles are made, where they are made, by whom they are made, and so forth. Figure 3 shows a few patterns that were secured by the author in this way.

If a woodworking shop is available, many patterns can be made of wood. This leads me to emphasize the opportunity which is open to those teachers of woodwork who desire to develop their courses into general shop courses without an outlay of much money. My suggestion is first of all to do a little wood patternmaking. This can be done in the woodshop, without adding any equipment. Then, by securing the necessary foundry equipment already mentioned, the patterns that have been made may be molded and cast in aluminum or brass. After an article has been cast in aluminum, it may be used as a pattern, provided the casting is smoothed up properly. The boys who do this work will get an insight into the metal patternmaking trade.

To summarize, then, a woodworking course may be developed at a negligible cost into a general shop course consisting of woodwork, patternmaking, foundry practice, and metal patternmaking.

THE TEACHING OF ELECTRICAL MACHINERY IN THE PART-TIME VOCATIONAL SCHOOL

Charles S. Siskind, Milwaukee Vocational School, Milwaukee, Wis.

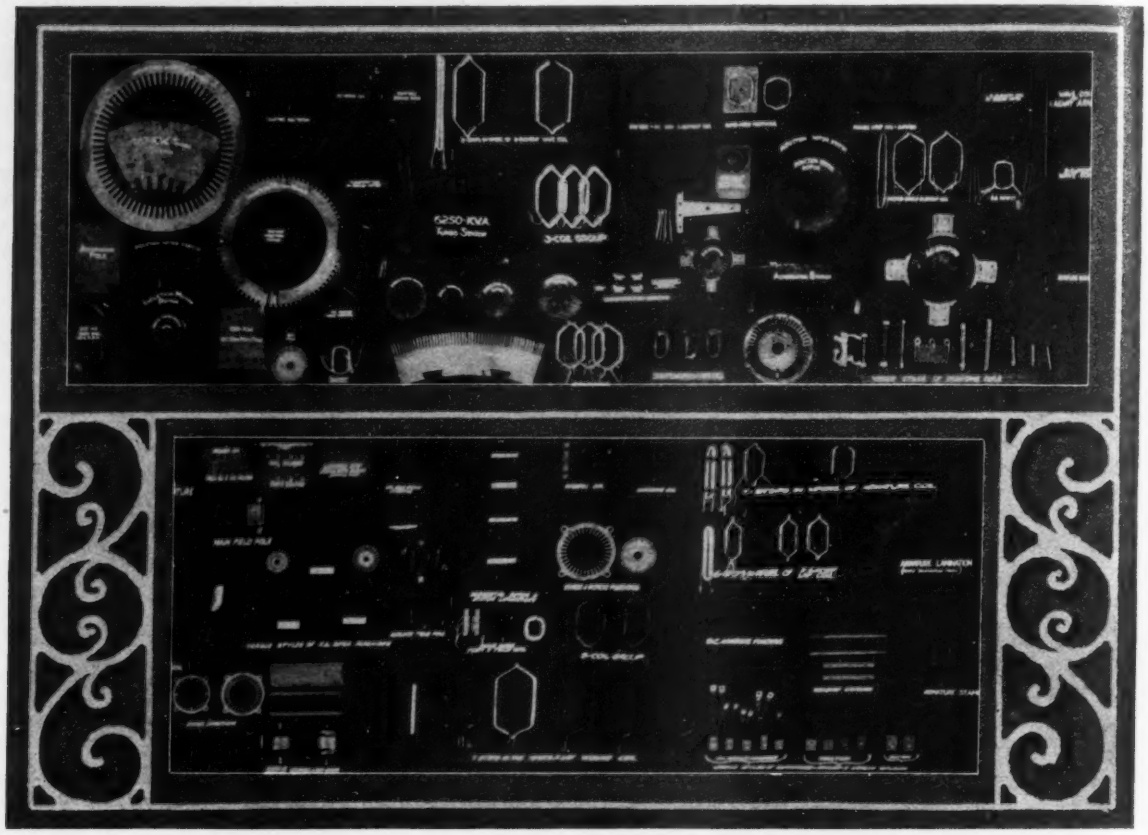
MOST of the instructional material given in the part-time vocational schools must of necessity be of an elementary character. This, of course, is essential for a number of reasons: First, the age range, which is fourteen to eighteen years, includes students of high-school freshman grade; second, the student comes to his class with a meager educational background; third, the student is usually in such circumstances that his most important objective is to earn rather than to learn; fourth, as a wage earner his educational contacts are few. These conditions, and possibly others, are, therefore, instrumental in lessening the extent to which a teacher may carry his students in his particular subject. The teacher's problem, then, in this type of school becomes a difficult one, because he must choose his instructional work in such a manner that every bit of it is thoroughly practical and yet contain enough technical information to clarify the subject without getting the student beyond his mental depth.

In order to emphasize the importance of this vital teaching problem, let us consider specifically the course in electrical machinery as given in the electrical department of a part-time vocational school. All students coming into such a class must be treated as though any previous training in electricity has been of little consequence. This fact is a matter of experience which the author has had with a large number of students. Of course, there are some students who may have studied the subject of electricity by themselves; still others may have taken elementary courses in the high schools; and others perhaps who may be working with electrical machinery in their everyday work. The percentage of the latter groups, however, is so small that the assumption that the training of the beginning student is negligible is entirely justified. Here, then, is the problem: An entering student with no electrical background, and in most cases not even a "smattering" knowledge of electrical circuits, must be taught how to operate motors and generators, controlling equipment and switchboards, and have it made adequately understandable without the intricate theoretical and mathematical considerations which thorough understanding presupposes. He must be kept busy and interested at the work which he intends to follow as a trade and yet his classroom and laboratory problems can never entirely explain to his satisfaction the mechanisms of the electrical circuits, for it is only through the study of the electrical theories that these manifestations are properly understood.

The solution of this problem, of course, may be attempted in a number of ways, two of which follow.

One method: The student may be sent to a class in elementary electricity, where, during a period of six months or even a year, he is taught the fundamental principles of electricity, and that only. This course would include the study of the elementary principles involved in resistance, Ohm's law, power, energy, heat, batteries, magnetism, electromagnetism, electromagnetic induction, and other simple theories in electricity. Academic work as well as laboratory practice would be included in this course. After this preparatory course, he is transferred to the electrical-machinery class, where he continues his studies. Obviously, this is the fundamentally ideal scheme, from a pedagogical point of view at least. It has, however, a number of inherent disadvantages. The student feels that he is deprived of one half to one year of actual contact with the operation of electrical machinery, and may, therefore, become discouraged to the extent that he may transfer his interest to some other trade, which is a privilege usually extended to the student. The object of this arrangement is obviously for the benefit of the student, although by virtue of the immature judgment of the latter, he does not seem to understand the value of this elementary training as he battles with the theoretical electrical problems, and, disillusioned as well as discouraged, turns to bricklaying or patternmaking, or some trade which is less attractive to him. Then again, there are those who are working with motors and generators in their everyday employment, and feel more keenly the need of knowledge in this field. To have to spend a preparatory

period in an elementary class seems, to the boy, to be of little immediate help, for he is primarily interested in obtaining knowledge which will give him a bigger wage in the near future. He, therefore, does not sense the potential importance which such a course would have on his future possibilities. Then there is also the boy between sixteen and seventeen years of age, who, after finishing such an elementary course, would not remain in the vocational school long enough to learn very much of the subject closest to his heart. It is plain, therefore, that the vocational-school student is to be considered in a different light from that of the full-time, technical-high-school boy, for upon the latter the school authorities have an almost complete educational hold, whereas the former must necessarily divide his devotion between two lords, the school and the job.



PANEL OF ILLUSTRATIVE MATERIAL FOR THE ELECTRICAL-MACHINERY CLASS

Another method: The student may be placed immediately into an electrical-machinery class. Taking the meager educational background of the beginning students into consideration, the course must be arranged in such a manner that it is not too difficult, and yet will provide useful information. It must be so designed that the interest of the student is always maintained and still must provide essential fundamental facts that are important in both an academical and practical way. Such a course might be outlined as follows: The first lesson might be devoted to the study of the motor in which an easily dismantled small machine is given the student, who, by taking it apart, learns the general construction, parts, kinds of material, etc., which go to make up this piece of apparatus. A second lesson might include the operation of this motor, the methods for reversing the direction of rotation and the problem of varying the speed. At this juncture the subject of resistance, magnetism, and Ohm's law can be brought in with special reference to the motor winding and field structure of the motor. In this way it is possible to serve two masters, so to speak, namely, academic theory and practical electrical application, and the course evolved to swing back and forth from theory to practice, and practice to theory. This scheme is obviously fallacious from the teaching point of view, for it does not approach the subject of electricity in quite the proper way. It does, however, attempt to do the next best thing, and in addition maintains the interest of the student, whereas the outline of the first course, as was pointed out, fails in this latter respect.

Another of the difficulties which all teachers, especially those of technical subjects, experience, is trying to impress the student with the physical proportions, shapes, materials, etc., of the apparatus or machine under discussion. In this connection it is evident that actual machine parts, properly mounted and labeled, and attractively displayed, serve to overcome this difficulty. These displays should always be visible, and especially when a lecture is delivered, and they should be referred to continually so that the student may rapidly become familiar with the new types. This is especially true with electrical machinery, because the student has few experiences which help him in this particular study, and because he is usually not as familiar with armature coils, laminations, and the like, as he is with fence posts, roof shapes, or bricks.

Practical Arts in the School

The purpose of practical-arts instruction should be to give an appreciative understanding of tools, materials, processes, and design as found in the work of the world. It should give information about the lives of the people concerned, about their manufactures, their beautification, and their transportation. Practical-arts work should be used as a vehicle to carry a rich educational content.—*F. T. Struck.*

THE VOCATIONAL TEACHER AND HIS BLACKBOARD

Wm. A. De Vette, Wilson Junior High School, Erie, Pa.

(Third Article)

RECENTLY I talked with a man who was a regular attendant at evening school and he told me that he liked a certain teacher because his problems were placed on the board in such a manner that one could not help but understand them. In fact, he said they appeared as though they were ready to step right off the board and come at you. I know he wondered at this quality in the blackboard illustrations, and it has been the despair of many teachers who have attempted to get this quality in their own drawings and have been unable to attain it.

Of course, there must be an explanation. In the two previous articles of this series, perspective drawings in their various phases were discussed. Suggestions for making blackboard illustrating more simple were offered but those who tried out the suggestions may still have been unsatisfied with the results and felt that their drawings were too "flat," that they did not "stand out" as they had hoped they would. The answer most likely lies in proper shading.

Line Rendering

Many of us can still remember the days when we "took" free-hand drawing. The main difficulty, however, seemed to be that we were merely exposed to it at a time when we were perfectly immune and it did not "take" at all. Still we may recall that we were told to assume that the light was coming over our left shoulder in striking the object we were about to draw. The same rule still holds good.

There was a time when the most convenient position of the teacher's desk was of prime importance in arranging a classroom. The seats of the pupils are now placed so that the light *does* come over their left shoulders and the students have become habituated to it.

We have become accustomed to look at objects with the darkest side at the right as we have become accustomed to using a heavy line when representing the right side of an object. When working on the board we follow this same method and use a heavy line, even though it gives us a sort of negative shading. Force of habit seems to make it right. In Figure 17 are shown drawings of two objects, the lines of which are made lightly where the light is supposed to strike most directly, and heavy where the light strikes more indirectly. The added weight of some of the lines gives the drawing the "life" which it would otherwise lack.

This method of bringing out a drawing is called "line rendering" and may be used very extensively for blackboard work. It consists merely in increasing the weight of the lines which represent edges of the object which are more or less in shadow.

Line Shading

In some cases it may be well to "shade" the drawing by drawing lines on the surfaces which receive less light than some of the others. Surfaces to the left and at the top would then be left blank while those facing toward the right would be shaded. Figure 18 shows several drawings which have been line-shaded with good effect.

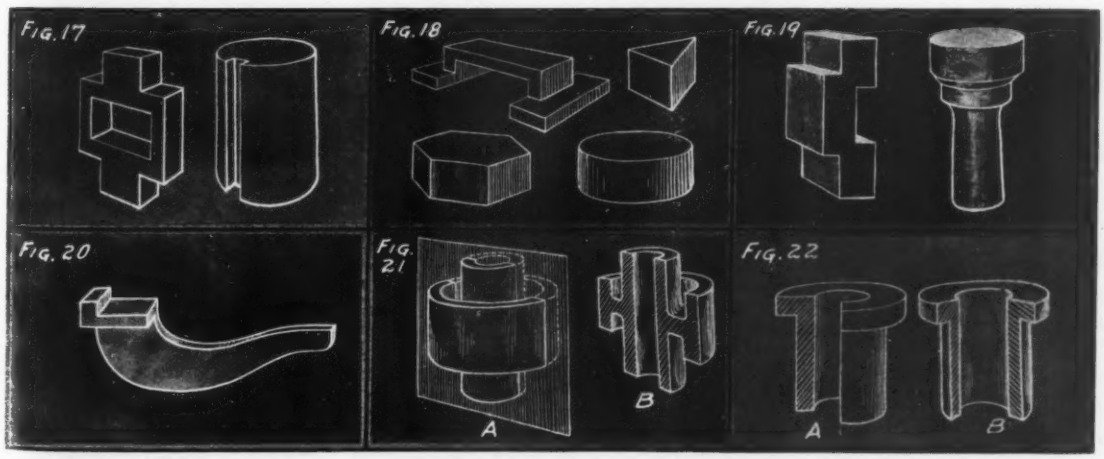
First, there is the rectangular object and the triangular prism in which the surfaces facing toward the right are shaded with lines in a vertical direction, the lines being vertical to help in differentiating these surfaces from the horizontal ones as well as to help in showing the shading.

In the drawing of the hexagonal prism, the surface at the top and the one at the extreme left are left unshaded. The central vertical surface is shaded very faintly while the surface at the right is shaded heavier to denote that this surface receives less light than the others.

Shading a cylindrical object presents a somewhat different problem because the surface direction is constantly changing and no two places receive exactly the same amount of light. For this reason the shading is made heavier at the edges and lighter as it approaches the point where the light strikes in the most direct manner. Assuming as before that the light comes from the left, this point falls slightly to the left of center. At this point there should be no shading, the shading at the right will naturally be somewhat heavier than at the left. In the hole this is just reversed, the shading being heavier at the left and lighter at the right because the light strikes more directly against this side of the hole.

Surface Shading

Another method of shading which is very effective is that of using the side of the chalk against the board and bringing out the high lights of the drawing in this manner. It is a very good method to use for shading drawings when the distance at which the drawing must be read is quite far, then the shading can be accented more than would be required for another drawing. Figure 19 shows a rectangular and also a cylindrical object shaded by this method.



When cylindrical objects are shaded by this method, those parts will be chalked heavily where the light strikes most directly. The chalk should then blend out gradually toward the left and right.

Background and Charcoal Shading

While a blackboard to all intents and purposes is supposed to be black, it may soon be discovered by drawing a line on it with a piece of charcoal that it is in reality not black but gray. This is an advantage rather than a handicap because the judicious use of charcoal on a blackboard drawing will work wonders. A hole on a drawing which is often hard to bring out clearly will be much improved by using a little charcoal along the edges.

Many a drawing may be given the "ready-to-walk-off-the-board" quality by going over the area surrounding the drawing with a piece of charcoal held flat in the hand. A well-cleaned eraser should then be used to smooth out the charcoal which has been applied. It is rather difficult to bring out this quality in a photograph of a blackboard drawing, but it is attempted in Figure 20.

Charcoal and other shading on the same drawing is not recommended.

Sectional Perspectives

In the field of mechanical drawing the most effective device for making complicated drawings more easy to read is the sectional view. In blackboard illustrations the same device may be used to good advantage for the same purpose, and with equally good results.

Sectional drawings are made by assuming that a part of the object has been cut away and then making a drawing of the part supposed to be still remaining. The assumed cut is made by an imaginary cutting plane which passes through the object at some point at which it is desired to show the interior of the object itself. In most cases this plane is passed through the object along a vertical center line cutting the object into two equal parts. All parts of the object cut by the plane are cross-sectioned, that is, lines are drawn across that part of the drawing showing the object cut. These lines are closely spaced, parallel to each other, and at some convenient angle with the horizontal.

Various types of lines or groupings of lines are used to denote certain materials but these may be looked up in any handbook on mechanical drawing and no space will be given to them here.

Figure 21A shows a perspective drawing of a pulley with an assumed cutting plane in place presumably cutting the pulley into two equal parts. Figure 21B shows the same pulley having the plane and that part of the pulley in front of the plane removed. Wherever the plane has cut through the casting, the drawing is cross-sectioned as noted before. Such a drawing is called a "full section."

In Figures 22A and 22B are two drawings of a bushing in which the plane is assumed to have cut away a fourth of the object. Such a drawing is called a "half section." Figure 22A shows a very simple method of drawing a half section, because by sketching in both halves lightly, there will be a skeleton upon which the ellipses may be made without difficulty.

In Figure 22B the object is sketched complete, first in light lines and the section cut away later. Due to the fact that the two surfaces in section are at an angle with each other, it will be misleading to cross-section them in the same direction. They should be cross-sectioned in opposite direction for good effect, although this is not in keeping with the rules of mechanical drawing.

There is nothing to stop one from removing any part of an object which may be found desirable at any time to make the interior construction more clear. Examples of this might be named, for instance, part of a mortise-and-tenon joint may be broken away to show the end of the tenon in the hole. A long piece of uniform cross-sectional shape may have a piece broken out of the middle and the ends brought within the limits of the drawing, a part of a piston may be removed to show ribs in the interior, or a piece of the rim of a pulley may be taken out to show the spokes.

Each teacher will, through experience, find certain kinks which will make the blackboard drawings in his particular subject both easier to make and to understand. For instance, an instructor in patternmaking may shade that part of the drawing of a pattern which represents the core print and leave the rest unshaded. Or he may stipple the drawing of a core instead of line shading it. A sheet-metal instructor may add the lines indicating the triangulation necessary for the layout of the pattern. All such kinks cannot be explained in this article and must be left for the individual teacher to discover for himself.

PAPERHANGING IN THE PRACTICAL-ARTS DEPARTMENT

Claude H. Ewing, Washburne Continuation and Trade School, Chicago, Ill.

Part I

THERE are several things that justify the teaching of paperhanging in the practical-arts department:

1. The instruction can be made adaptable for both boys and girls for general education. (2) The work can be given for orientation at the prevocational age. (3) Paperhanging is a phase of the decorating trade that can be successfully taught in the schools, therefore it is practical for instruction at the trade-training level. (4) It is economical, as such a class will be supported by outside agencies. (5) There is a shortage of paperhangers.

For General Education. To make the practical-arts program function as training for general educational ends, there is nothing more vital than to make it contribute to the knowledge necessary for establishing and operating a home. Such training is always valuable, and a course organized with that in mind will not be merely excess baggage, as is the case with many courses.

A study of home decoration centered in a paperhanging class can be the means of giving instruction to both boys and girls concerning color, color harmony, adaptability of decorating materials, economy in decorating, and as a remote objective, skill in handling some of the materials.

This is knowledge that is valuable to every individual in order that they may enjoy life to the fullest extent. The happiness gained just by planning or doing some of our own home decoration cannot be measured.

As a means of selling the school program to the pupils, and thus retaining them in school, this work cannot be overestimated for it will be the connecting link between their school life, and their homelife.

For Orientation. Many schools attempt to give orientation courses in the industrial-arts department, but the actual results which they accomplish are often negligible because they do not offer the proper shop courses.

To make an orientation program effective, it is necessary that as many phases of industrial life as possible be covered, and the customary shops in woodwork, sheet metal, printing, etc., do not offer the wide range of experience which is necessary if the pupil is to be given a real opportunity to arrive at a sensible choice.

A paperhanging shop offers experience in the decorating field that can be part of an orientation program for both boys and girls. The course can be made to fit in with the household-arts courses, or it can consist of a series of lessons to give instruction in hand skills along with related information.

For Trade Training. Every school doing practical-arts work needs advertising. At least, something in the school ought to arouse people to take notice of the schoolwork which is being done. Too little is known about the things actually accomplished and it is largely because the teachers are too timid, or because they do not recognize the need for selling their particular course or courses.

A paperhanging class conducted for trade training can transform the appearance of the interior of a school building in a very short time. A bright panel of wallpaper in the corridor or in an otherwise dark and dingy place will accomplish much, because it brings color into a place which would otherwise be drab and neglected. This phase of the work may also act as a stimulus to other school departments to attempt projects which they might otherwise not attempt.

Paperhanging is a part of the decorating trade that can be taught successfully to apprentices in a schoolroom. Since a great deal of practice is necessary for this kind of training, the projects previously mentioned can very appropriately be carried out without deviating from a well-organized course of study.

Out of a group of 152 union apprentices entering the Washburne Apprentice Training School in Chicago, at the opening of school in September, 30 were used as paperhangers during the following spring rush, although they attended school but one day each week. The school does not claim all the credit, but there is no doubt that the training received in school was instrumental in giving the apprentices the required skill and technic, so they could be put to work when the demand for paperhangers exceeded the supply.

Shortage of Paperhangers. In Chicago alone, the shortage of paperhangers during the year 1925 was estimated at 1,000. During this time it was always possible to hire painters. Since 1917 there has always been a country-wide demand during the spring and fall cleaning seasons for paperhangers. This fact alone, then, will justify a paperhanging department in schools. More than this, it will give the department support that might otherwise be lacking.

Outside Aid Possible. To any school wishing to organize a paperhanging class, either for trade training, prevocational work, or for general education, numerous aids of every kind are available.

The Wallpaper Manufacturers Association of United States with offices at 461 Eighth Avenue, New York, have a National Director of Vocational Education, Mr. E. K. Jenkins, who spends all of his time working out the educational phases of wallpaper. By corresponding with him, it will be found possible to secure wallpaper, paste, and patching plaster in any quantity necessary to carry on instruction. This organization also has material of an educational nature for related classwork. Their aim is to educate people to the value and possibilities of wallpaper.

The International Master Painters Association at their convention, February, 1928, at Houston, Texas, considered a program of trade training to cost approximately $35,000 a year, and every officer of that association is vitally interested in this problem and will, no doubt, be glad to cooperate with school officials in the organization of trade classes.

The painters' union and other labor organizations are thoroughly awake to the value of education and, in many cases, schoolmen will find the local painters' organizations eager to cooperate with the school in the organization of classes for the training of apprentices.

Because of this available aid, a paperhanging class for any level of education will have practically no operating expense, and the equipment that is required is quite inexpensive.

OBJECTIVES FOR DRAFTING COURSES

Towne R. Abercrombie, Ironwood, Michigan

A LARGE majority of our high schools have courses in drafting at the present time. Some offer it for a limited period, others for full time. Its incorporation into the curricula of the various school systems, would increase to a greater degree, if a unified course of work could be established that would fit the needs of all communities. At present there is a great variety of content matter from which we may choose a course, but there does not appear to be a really practical standard course that would serve as a basis for all drawing courses.

The different needs of the various communities would prevent the establishment of a definite set of drawing problems for any of the various lines of drawing as given in our schools today. Students are of different temperament, look into the future with different vocational aspirations, and all of our drafting rooms are not equipped to give a standardized course.

While it may not be possible, or practical, to institute a standardized course of problems, it is possible and practical, however, to establish a standard as far as our general aims or objectives are concerned, and these objectives can be pliable enough to suit the requirements of any drawing work. There are several things which should enter into them. No one single objective could be used alone and make our courses practical, but taken together they offer opportunity for standardizing our drawing work and placing it in the curricula of our schools as a preeminent cultural subject.

Following are several of the items which I believe should enter into our general objectives:

1. To learn to read a drawing.
2. To learn how to make drawings of shop projects.
3. To gain an insight into the draftsman's trade.
4. To train in habits of neatness, accuracy, and observation.

Too many of our drawing courses at present are founded on simply one of these objectives, and in a great many instances a course is given without any general aim, simply a makeshift course in drawing that produces no results as far as future use is concerned, and the student, after completing such a course, has no conception of why the course was offered or what he was expected to gain from it.

The Commission on the Reorganization of Secondary Education presents the following explicit purpose, or goal of education in a democracy:

"The purpose of democracy is so to organize society that each member may develop his personality primarily through activities designed for the well-being of his fellow members and society as a whole. This ideal demands that human

activities be placed upon a high level of efficiency; that to this efficiency be added an appreciation of the significance of these activities and loyalty to the best ideals involved, and that the individual choose that vocation and those forms of social service in which his personality may develop and become most effective. Consequently, education in a democracy should develop in each individual the knowledge, interests, ideals, habits, and powers whereby he will find his place."

This commission has presented the seven cardinal principles which should guide the development of secondary education. If our drawing work is to be given a place as an educational, as well as industrial subject, we should endeavor to base the subject on some of these principles. From these seven principles, we can select perhaps two that will serve as examples of the correlation. First, *fundamental processes.* Every branch of work has its fundamentals which should be taught in connection with our courses. The second principle to be considered is *vocation.* This can naturally be very easily applied. The individual should choose that vocation in which his personality may develop and become most effective.

For drafting work, then, the objectives for the various courses may be stated as follows:

Mechanical Drawing: To teach the fundamentals of mechanical drawing; to develop the power of visualization and constructive imagination, and to teach the student how to read and write the graphic language of the industries. To give him modern industrial practice in drafting in order that he may have an understanding of this trade for the purpose of selecting his future vocation.

Machine Drawing: To teach the fundamentals of machine drawing and design; to develop the power of visualization; to enable the student to read and write the graphic language as related to all machines or structures; to give a thorough course in the correlation of departmental work; to express the transposition of a perspective to a working drawing by free-hand sketching, and to give a minimum of modern industrial practice in drawing.

Architectural Drawing: To teach the fundamentals of architectural design and construction; to teach the various types and styles of homes and structures, and the history of each; to instill a sense of appreciation for architectural beauty that will be beneficial to the student as well as to the community from a civic standpoint; to give as much practical architectural experience as possible so that, should any desire to enter the architectural draftman's trade, they will be as well fitted as it is possible for a high-school course to prepare them for their chosen vocation.

The foregoing objectives follow closely the recommendation of the commission, as they outline them. To achieve the objectives, the drawing-room activities must be placed upon a high level of efficiency, and to this efficiency must be added an appreciation of the significance of the activities. Throughout the course the student must be guided to choose a vocation in which his personality may develop and become most effective. The adoption of these stated aims or objectives for drawing-room courses has proved itself beneficial in every respect wherever they have been used. The courses, which have objectives, no longer remain merely "fill-in" courses. Instead, they are furnished with a sound, practical basis, and from the definite results thus obtainable, it seems that the adoption of unified objectives would place these subjects on their proper plane in all school curricula.

FOR THE CABINETMAKER'S NOTEBOOK

W. G. Hjerstedt, Roosevelt High School, Chicago, Illinois

BOULLE, CHARLES ANDRE (1642-1732). Charles Andre Boulle possesses the distinction of having been an architect, painter, carver in mosaic, artist in cabinetwork, inlayer, and designer of figures. His skill was great in all these branches, and he carried them to a high degree of artistic perfection in timepieces, screens, furniture, and other articles. He worked for the royal residences of Louis XIV, and for foreign princes, and attained great fortune and position.

He was specially noted for his inlay work for which he employed numerous woods, metals, ivory, and tortoise shells.

BOULLE. A special form of marquetry of brass and tortoise shell by Andre Charles Boulle in the reign of Louis XIV The name has been corrupted into a trade term "Buhl" to denote this style of marquetry. Boulle or Premiere Partie is a metal inlay, usually brass, applied to a tortoise-shell background.

BYZANTINE—300 A.D. to 1400 A.D. The "Eastern Roman" style, originated when the capitol of the Roman Empire was removed to Constantinople (then called Byzantium). It is a combination of the Persian and the Roman. It influenced the various Moorish, Saracenic, and other Mohammedan styles. One of its chief characteristics is its ornamentation, which is composed of geometric patterns interwoven with animal and floral forms. The peculiar sharp-pointed acanthus leaves is used extensively and rich decoration effects are produced. Very little of the furniture of this period came down to us, however. Probably the most interesting piece left is the chair of "St. Peter" in Rome. It was inlaid with ivory and gold and is one of the oldest pieces of furniture in existence.

CHIPPENDALE, THOMAS. (1705 to 1779.) Thomas Chippendale, the first great cabinetmaker of the Georgian period and most famous of English cabinetmakers, became widely known as a carver, cabinetmaker, and craftsman as well as a great furniture designer. He was born in 1705, three years after Queen Anne ascended the English throne, in 1702, and lived to the age of 74, a long, active, vigorous, and versatile life. Though not born in London, it was only a matter of time before Chippendale came to the city to establish himself in business. It was not, however, until the middle of the century that he began to achieve widespread fame as a furniture designer. Chippendale was the first designer to publish a book of designs and this brought him distinction, fame, and ascendency. His book, entitled, "The Gentleman and Cabinet Maker's Director," appeared in 1754, being widely accepted as a standard of taste for household furnishings, and did much toward spreading his ideas and popularizing his style.

Through Chippendale's influence and efforts the perfection and refinement in furniture advanced more than through the combined efforts of his contemporaries. He was more a translator and manufacturer than a creator and designer, adopting Dutch, French, and Chinese designs, and through the power of his genius brought them to greater heights of artistic merit. Peerless as a wood carver, he could adopt any style, shape it to his own tastes, and achieve an original creation of rare grace and beauty that stands to his everlasting credit.

CHIPPENDALE FURNITURE. (1754 to 1800. See French, Gothic, and Chinese Chippendale). The style of furniture, known as the Chippendale, was made by Thomas Chippendale and his son during the Georgian period. It reached the crest of its popularity about the middle of the eighteenth century. Chippendale furniture may be roughly classified under the various influences which were brought to bear upon it, that is, Queen Anne, French of Louis Quatorze and Regence, Classic, the Chinese with variations of classic, Louis Quinze and Gothic motifs, and Gothic. Several influences were at times manifested in one piece of furniture, or even in a single motif, but even considering the many transformations which this style underwent, there is an unmistakable sameness and character to the furniture of the Chippendale school. French influence resulted in his finest creations, combining the graceful and delicate Louis XV period with solidarity of construction and simplicity. The third influence was oriental, producing furniture of rectangular lines with Chinese fretwork and carved motifs. This work was governed by popular demand and varied widely and is difficult to classify. Chippendale chests of drawers (forefathers of bureaus and dressers) are characterized by graceful swelling fronts and sides, with an occasional serpentine front. The top line of Chippendale furniture varied, while desks and drawer chests show scrolls or broken pediments.

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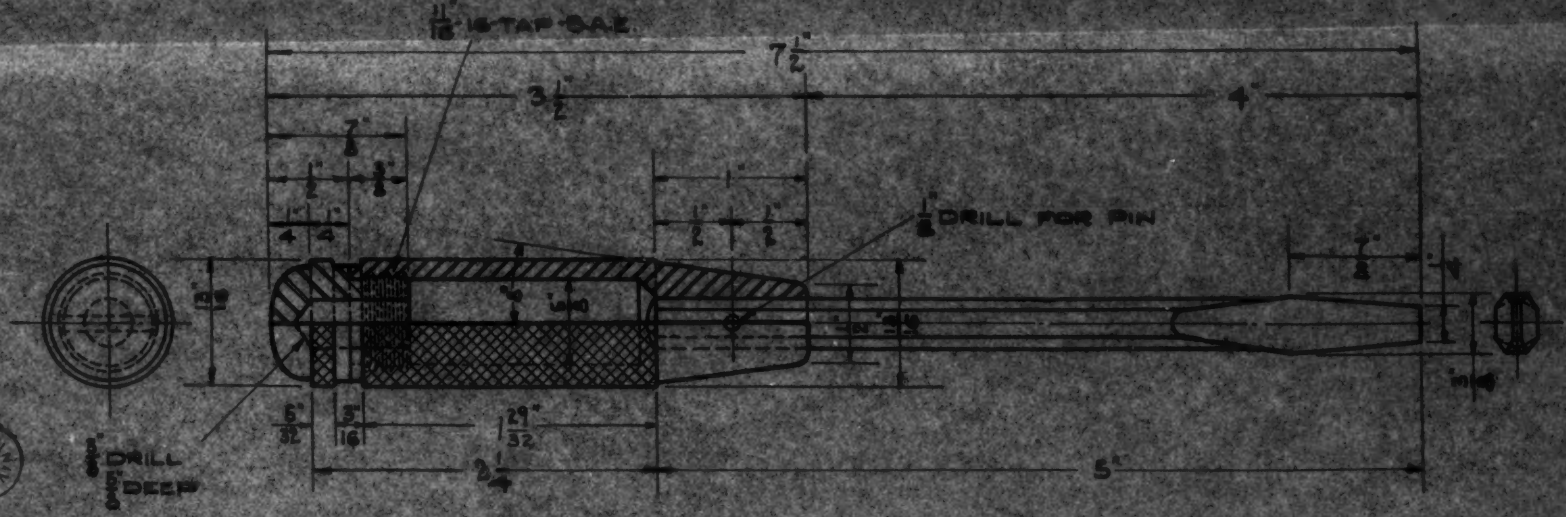
MACHINE SHOP JOB



1- SAW OFF $3\frac{1}{2}$" OF $\frac{7}{8}$" STOCK.

2- CHUCK TRUE SO AS TO LEAVE $2\frac{3}{4}$" EXTENDING OUT.

3- FACE END AND DRILL CENTER HOLE.

4- DO NOT REMOVE FROM CHUCK.

5- SUPPORT OUTER END OF WORK WITH TAIL STOCK CENTER.

6- TURN STOCK TO SIZE AND KNURL.

7- DRILL $\frac{5}{8}$" HOLE IN HANDLE & TAP AS SHOWN. (IN LATHE.)

8- RE CHUCK ACCURATELY.

9- SET COMPOUND REST TO GIVEN ANGLE & TURN TAPER.

10- DRILL $\frac{17}{64}$" HOLE FOR BIT.

11- MACHINE THE PLUG THE SAME WAY AS HANDLE.

12- SCREW PLUG INTO HANDLE & THEN TURN OVAL END OF PLUG. AVOID MARRING HANDLE WHEN CHUCKING UP.

13- CUT OFF $4\frac{1}{2}$" OF $\frac{1}{4}$" OCTAGON TOOL STEEL.

14- PRESS BIT STOCK INTO THE HANDLE.

15- FORGE, GRIND AND FILE BIT INTO SHAPE.

16- HARDEN & TEMPER BLADE.

17- POLISH HANDLE & END OF BLADE.

Screw Driver, Designed by C. H. Niemann, Hammond, Ind.

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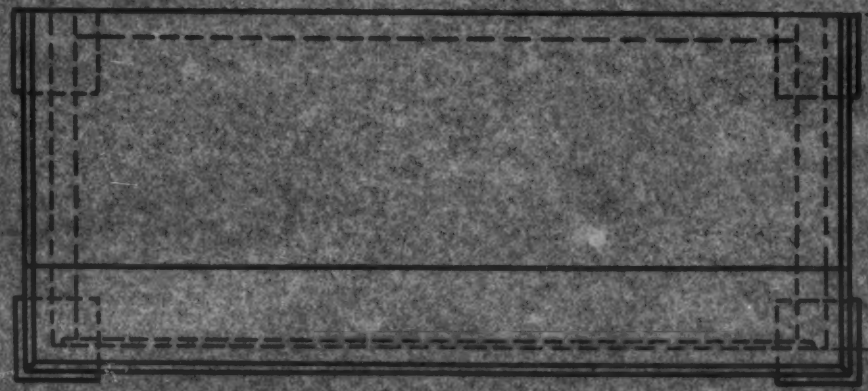
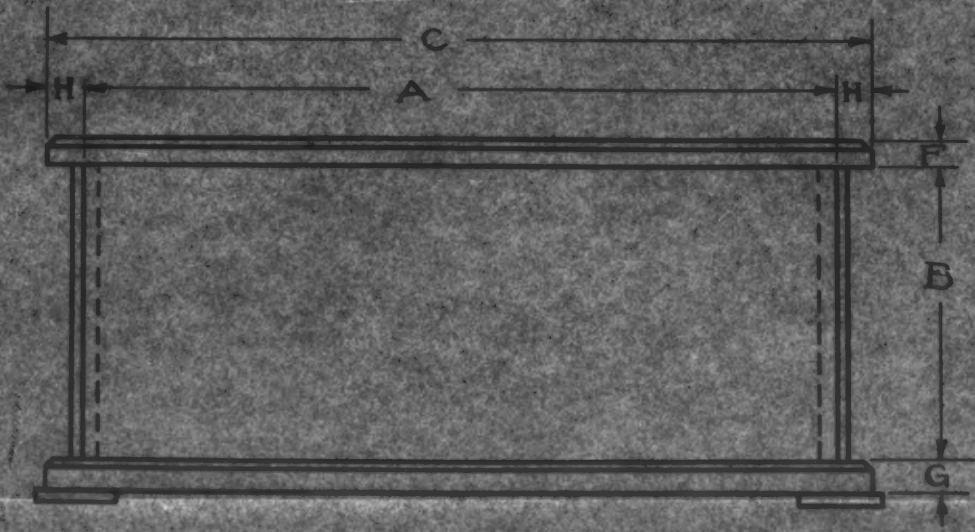
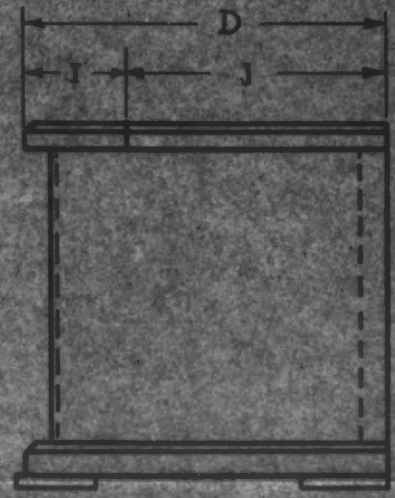


Panel Size	A	B	C	D	E	F	G	H	I	J
7"X 6"	7"	6"	8¾	6⅝	8"	⅝	¾	1"	2½	6⅛
12"X 7"	12"	7"	13¾	8⅝	8	⅝	¾	1"	2½	6⅛
14"X 7"	14	7"	15¾	8⅝	8	⅝	¾	1"	2½	6⅛
18"X 7"	16	7"	19¾	8⅝	8	⅝	¾	1"	2½	6⅛
21"X 7"	21	7"	22¾	9⅛	8½	⅝	¾	1"	2½	6⅝
24"X 7"	24	7"	25¾	9⅛	8½	⅝	¾	1"	2½	6⅝
26"X 7"	26	7"	27¾	9⅛	8½	⅝	¾	1"	2½	6⅝





Harold W. Blake

HWB

Designed by Harold W. Blake, Fitchburg, Mass.

For Description See Page 363, Industrial-Arts Magazine, October, 1928

TRACING SUPPLEMENT No. 111,
THE INDUSTRIAL-ARTS MAGAZINE,
OCTOBER, 1928

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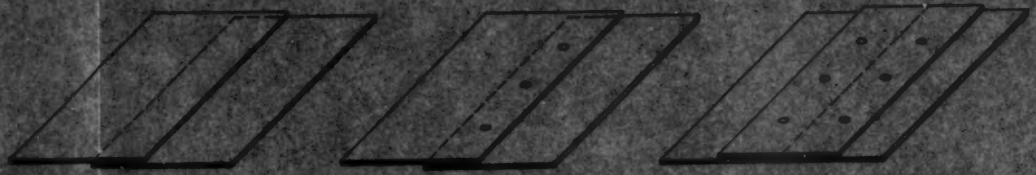
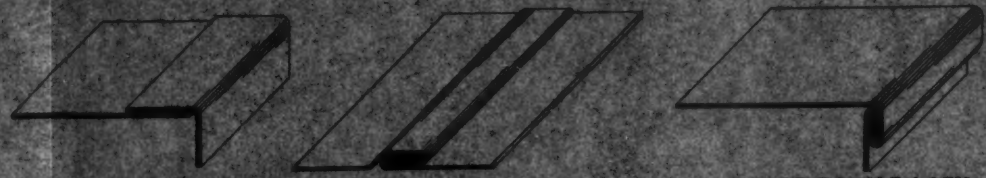
— LOCKS, SEAMS & JOINTS USED IN SHEET METAL JOB SHOPS —



NO. 1- LAP SEAM
Chicken feed pans, Candy pans, Cookie cutters, Doughnut cutters, Tubes on funnels

NO. 2- RIVETED LAP SEAM
Dust pans, Pipe, Elbows

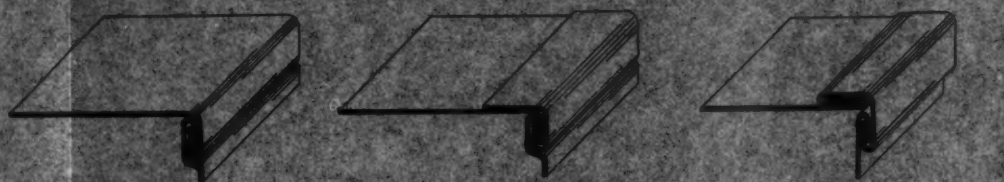
NO. 3- SINGLE BUTT STRAP
16 gauge or heavier pipe



NO. 4- OUTSIDE CORNER LAP
Square ducts, Boxes, Tanks

NO. 5- GROOVED FLAT LOCK
Pipe, Pint cups, Quart measures, Funnels, Tanks

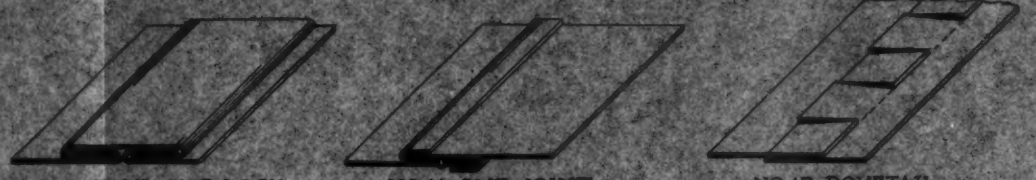
NO. 6- CORNER DOUBLE LOCK
Waste baskets, Sq. pipe, Sq. elbows



NO. 7- CORNER DOUBLE LOCK
Sq. pipe, Slip joints

NO. 8- PITTSBURGH LOCK
All square duct work

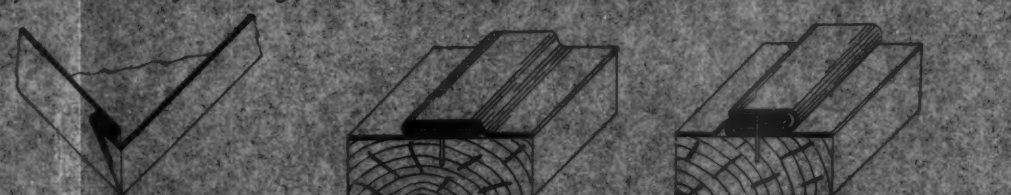
NO. 9- CORNER CLIP LOCK
Ventilating and heating ducts, Lining stacks



NO. 10- FLAT CLIP LOCK
Square ventilating & heating pipe

NO. 11- SLIP JOINT
Ventilating & heating pipe

NO. 12- DOVETAIL
Copper work joints-brazed



NO. 13- CORNER FOLD
Bread & cake tins, Wax pans

NO. 14- FIRE DOOR LOCK
Covering fire doors & frames

NO. 15- FIRE DOOR LOCK
Covering fire doors

NO. 16- CASH BOX JOINT
First aid boxes, Bread boxes

NO. 17- BEADED JOINT
Cake tins, Tubular stoves, Reducers, Elbows

NO. 18- WIRED JOINT
Pails, Ash cans, Garbage cans

Designed by John P. Faber and Henry Anderson, Erie, Pa.

For Description See Page 363, Industrial-Arts Magazine, October, 1928.

RECEIVED

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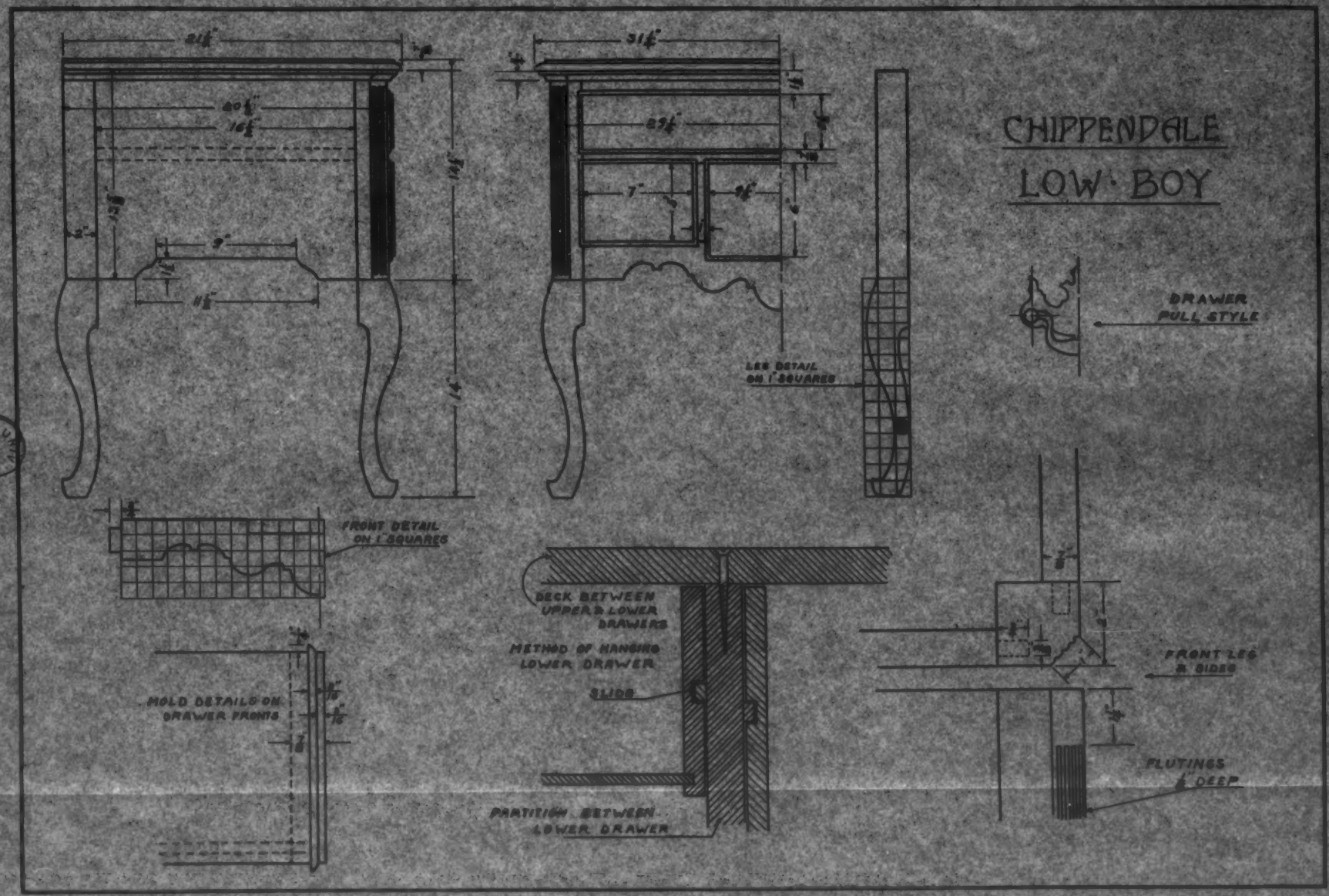


Designed by Paul C. Hoopes, Roselle, N. J.

For Description See Page 365, Industrial-Arts Magazine, October, 1928.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

CHIPPENDALE LOW BOY

Paul C. Hoones, Roselle, N. J.

(See Supplement No. 108)

This piece is drawn from an original and is true except the feet which were claw and ball. Since this type of feet is rather too difficult for the average high-school pupil, they were omitted and the ones shown substituted. The material used in the original is mahogany, but the piece also makes up well in black walnut. Material that has a good grain should be selected.

In cutting the leg shapes, care should be taken to follow the drawing exactly. A template is first made and the shape laid out on two sides of a 3 by 3-in. stick. This is cut on one side and the scrap pieces replaced, then the piece is cut on the other side. The curved portion of the leg is then rounded with a rasp, cabinet file, or spokeshave, scraped smooth and sanded.

The fluting on the beveled corners of the front legs may be omitted, but its omission detracts considerably from the beauty of the finished job. If the beveling and fluting is done before the legs are glued to the ends, some trouble will be encountered when clamping for the gluing, as the bevel does not allow the clamps to draw up as they should. It is therefore suggested that the beveling and fluting be done after the frame is glued up. This is the more difficult and unhandy way of doing the job but it insures the true drawing up of the clamps.

The ends and back of the low boy are solid pieces with a tenon their full width. These are mortised into the legs so that they are flush with the face of the legs. Great care should be taken in laying out the mortises so that the sides do come exactly flush with the leg faces.

The front frame consists of five pieces and should be assembled in part before gluing into the job. That is, the lower curved piece, middle stretcher, and the two vertical parting pieces between the lower drawers should be glued together first. After the ends of the low boy are glued up, the front and back are glued in place. If the job is not glued up perfectly square, trouble will be encountered later when fitting the drawers in place. Due to the width of the back and side pieces, it is not well to depend upon any spring in the job to bring it square.

The top is next fastened to the frame. It may be fastened in any of the usual ways of fastening tops to frames.

The deck between the upper and lower drawers is next fastened in position by means of ⅞ by ⅞-in. strips supporting the ends of the deck. The strips are screwed tight to the ends of the low boy, there being enough clearance between the inside of the end and that leg face which forms part of the drawer opening. Before placing the deck in position, the supporting partitions between the lower drawers should be screwed tight to the deck as shown in the detail "Method of hanging lower drawers." The runner strips on these partitions should be put in place when the drawers are fitted. The outside runner strips for the 5 by 7-in. lower outside drawers are fastened to built-up pieces which are screwed to the inside of the ends of the low boy.

The hardware is of antique brass such as suggested in the detail. Two pulls should go on the top drawer, and one on each of the lower drawers. There were no locks on the original, but they may be used if desired. Escutcheons to match the pulls should be used.

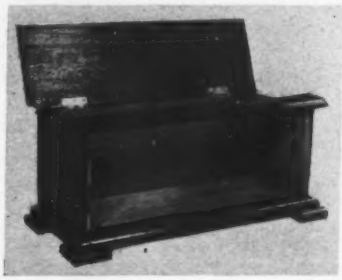
RADIO CABINETS FOR STANDARD-SIZE PANELS

Harold W. Blake, Fitchburg, Mass.

(See Supplement No. 110)

The radio cabinets shown in the accompanying supplement have been successfully made in the manual-training departments of our school.

The cabinets may be made of oak, walnut, mahogany, or whitewood. If made of whitewood, it may be stained to represent any of the above mentioned woods.



Dimensions for cabinets having standard-size panels may be obtained by substituting the dimensions on the chart in place of the letters on the drawing.

All stock should be ⅜ in. thick except the base which should be ¾ in. thick and the blocks on the corners which are ½ in. thick and 2 in. square.

The top and bottom should have a ¼-in. chamfer on both ends and the front edge.

The joints are all butt joints fastened with 1½-in. brads.

Two nickel-plated hinges ½ by 3 in. should be used to fasten the back of the top to the cabinet.

Anyone making a cabinet for a 1-tube set should make it large enough for a 3-tube set, should he want to add more tubes to his set later on, thus avoiding the necessity of making a new cabinet.

LOCKS, SEAMS, AND JOINTS USED IN SHEET-METAL JOB SHOPS

John F. Faber and Harry Anderson, Erie, Pa.

(See Supplement No. 111)

The chart on locks, seams, and joints used in sheet-metal job shops covers all the connections commonly met within school shops and in industrial shops where job work is done.

The kind of work, or the projects on which each connection is used, also is given.

A DRY CELL FOR THREE CENTS

Frank Kennon, Owatonna, Minnesota

The importance of electricity as a unit in our shop courses is now beyond argument. The cost of the course is small, but in the smaller schools, where equipment is limited, and money for new equipment is even more limited, the instructor is faced by the necessity of making even a small cost smaller.

The dry cell plays an important part in the elementary electrical course, both as a project for study as to its construction and use, and as a piece of equipment in the study of bells, buzzers, electromagnets, etc. The rebuilding of a dry cell makes an excellent project, as it gives a thorough understanding of the construction and at the same time effects a real saving in equipment cost as compared with buying new cells. The writer has used this as a project for several years and has finally worked it down to a point where the cost is practically nothing and the necessary tools are so few that they can be found in any shop. Very little skill is required on the part of the pupil so that the project can be used in the seventh grade or even lower.

The required materials are a discarded dry cell, an old tin can, a piece of zinc about 4 by 15 in., and a tablespoonful of powdered sal ammoniac.

The required tools are tin snips and a hack saw. One boy went so far as to eliminate even these and made up a dry cell at home with a pair of old scissors as his equipment. If a soldering outfit is available, it can be used to advantage, but it is not absolutely necessary. By soldering the joints and the terminal post, a better job is obtained and the boy gets some experience in soldering, but the cell will work either way.

The first step in the project is to cut down the height of the tin can which is to form the outside of the new cell. About 4 in. makes a good height, although neither the height nor diameter have to be to any set dimension. The next step is to cut a circular piece from the sheet of zinc, that will fit tightly into the tin can. Place this in the

bottom of the can and from the rest of the zinc cut a rectangular piece with a width equal to the height of the can, and length equal to the circumference of the can with a half inch added for the lap. This piece is shaped either on forming rolls over a round piece of wood, or by hand, and placed inside the can forming the lining for the side of the dry cell. If soldering tools are at hand, solder the lap and the lower corners, and if sheet-metal equipment is available, lock-seam the side joint, and burr and lock the joint between the side and bottom. This, of course, cannot be done except in the school with special equipment. However it is not essential to the successful working of the finished cell.

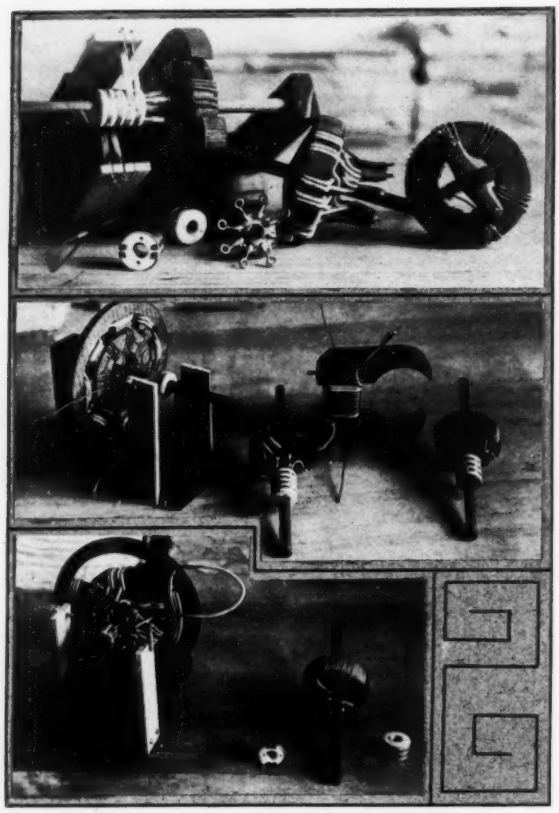
The negative terminal is next removed from the old cell and fastened to the upper edge of the zinc side lining. If soldering tools are available, it should be soldered. If not, clean out the solder from the split with a hack saw, force it down over the edge of the zinc and pinch it down tight with pliers or hammer.

A layer of heavy unglazed wrapping paper should be placed inside the can, covering both the bottom and sides. The paper should extend above the sides an inch or so to allow for turning over the top.

The next step is to tear down the old cell. The sealing compound and the sand or sawdust layer found inside of the old cell should be saved. If the new cell is much larger in diameter than the old one, the sealing compound and sand from two old cells may be required. The carbon stick should be removed without breaking and the bottom sawed off to fit the height of the new can. The carbon paste compound which will probably be dried hard, should be pounded fine in a tin pan, or box, and moistened with a saturated solution of water and powdered sal ammoniac.

To assemble the new cell, place the carbon post upright in the center of the new can and place around it the moistened paste, tamping lightly and being careful to avoid tearing the paper lining. When within an inch of the top of the can, fold the upper edge of the paper side lining over toward the carbon post. Then pour over it a quarter of an inch of dry sand or sawdust, over all pour the melted sealing compound to a thickness of a quarter of an inch. Let the cell set for a half hour or so and it is ready for use.

The process, as here outlined, is given in its simplest form, calling for a minimum of tools, machinery, time and pupil skill. Where time and equipment is available, a neater and more workmanlike project can be developed, but in either case, it is a project that is extremely interesting to the boys, that is instructive, and that will result in a product which, if properly made, will hold its own for several months with a new dry cell.



Wooden Models for the Study of Dynamo Electric Machinery.
Top: Bi-polar field with two-phase armature in place.
Center: Multi-polar alternator, Bi-polar field. Two-phase and three-phase rotors.
Bottom: D. C. Generator, two-pole armature.
Models made by manual-training students at Ayrshire, Iowa.

FARM MECHANICS
HOW TO LAY OUT STAIR STRINGERS

L. M. Roehl, Cornell University, Ithaca, N. Y.

The following drawings and directions are given in sufficient detail to make it possible for a student to measure the place where the stairs or steps are to be placed, lay out the stringers, and build the stairs.

1. Find the total rise and run of the stairs in inches. Figure 1 shows a rise of 6 ft. 4 in. or 76 in., and a run of 7 ft. 6 in. or 90 in. There is always one more riser than treads in a flight of stairs. The stairs in Figure 1 has 11 risers and 10 treads.

2. If possible, divide the total rise so that each riser will not be over 7 in. and the treads not less than 9 in. A wide tread and short rise makes an easy stair. Deviation from the above figures may be necessary to fit a stair to a given space.

3. If the stringer is to be placed on a concrete floor or other place where a finished floor is not to be laid, the first riser must be made 1 in. less than the others because the treads which are usually 1 in. thick raise it 1 in. but do not change the height of the others. It will be noted in Figure 1 that the first riser is 6 in. and the other 10 are 7 in. each.

4. Place the plank which is to be used for a stringer on a pair of saw horses and square one end by drawing a line across one side near the end at right angle to the edge, as shown in Figure 2.

5. Place the steel square on the plank as shown in Figure 3, with 9 in. on the blade for the run, and 7 in. on the tongue for the rise, and locate point X.

6. Draw a line through point X parallel to the edge of the plank.

7. Place the square on the line as shown in Figure 4 and draw a line along the tongue of the square. The stock to the right of this line is cut away thus making the surface at which the upper end of the stringer rests against, and is fastened to the header or sill.

8. Turn the square over as shown in Figure 5 and draw a line along the edge of the blade and tongue. This is the first tread and riser at top.

9. Place the square as shown in Figure 6 and lay off the second tread. Continue this until the total number of risers and treads have been laid off.

10. Measure down the required distance from the top end of the last riser, which in this problem is 6 in., and draw a line parallel to the bottom tread (see Fig. 7), or if the plank is not long enough to allow the square to be placed in the usual way, a line may be drawn parallel to the edge of the plank as shown in Figure 3, and the square turned over as shown in Figure 8. At 6 in. on the tongue of the square, a line is drawn parallel to the tread for the floor-line cut.

11. A stair constructed with cleats for the treads to rest on, instead of cuts in the stringer, is shown in Figure 9. It will be noted that the rise is 8½ in. and the tread 9½ in. The rise at the bottom step is 7 in. Using 1-in. boards for treads makes the first riser 8 in. and all others 8½ in.

12. The method of framing for the upper end of the stair in Figure 10 is shown in Figure 11. One or two joists are taken out for the stair well, depending on the desired width of the stair. The header shown in Figure 11 is placed far enough from the beam to allow the top edge of the beam to be used as a tread. A second header, 7⅞ in. wide, which is the height of the risers, is placed against the first header as shown in Figure 11. The top edge of this header and the blocks nailed to the sides of the joists are used for the top tread. By this arrangement a longer and easier stair is possible than would result if the top landing were on the floor above the beam.

13. The following problem and solution is shown in Figure 12. To lay out stair stringers for a 36-ft. barn, the ceiling of which is 8 ft. 6 in., a 10-in. floor beam supports 12-in. joists. The stair leads from a point on the floor 12 ft. 6 in. from the outside of the barn to a 3 ft. 6-in. platform. The total rise is 114 in. This makes 15 risers at 7 7/15 in. and one at 6 7/15 in. The total run of 108 in divided by 15, the number of treads, makes each tread 7.2 in. The head room should be at least 6 ft. This layout provides 6 ft. 5⅝ in.

14. The layout of a stringer for the steps of a porch or granary is shown in Figure 13. The total rise of 33 in. makes four risers of 7 in. and one of 5 in. Placing a 1-in. tread on the steps makes the first riser 6 in. and each of the others 7 in. The 32 in. of run makes a run of 8 in. for each step.

15. A way to lay out a flight of stairs with a platform and right-angle turn is shown in Figure 14. The total rise for the bottom flight is 68 in. This is divided into 7 risers of 8¾ in. each, and the bottom one 7¾ in. By using 1-in. material for treads it makes all risers 8¾ in. The run for the lower stair is 63 in. which makes 7 treads of 9 in. each. The upper flight has a total rise of 34 in. which makes 4 risers of 8½ in. each. The 27-in. run makes 3 treads of 9 in. each.

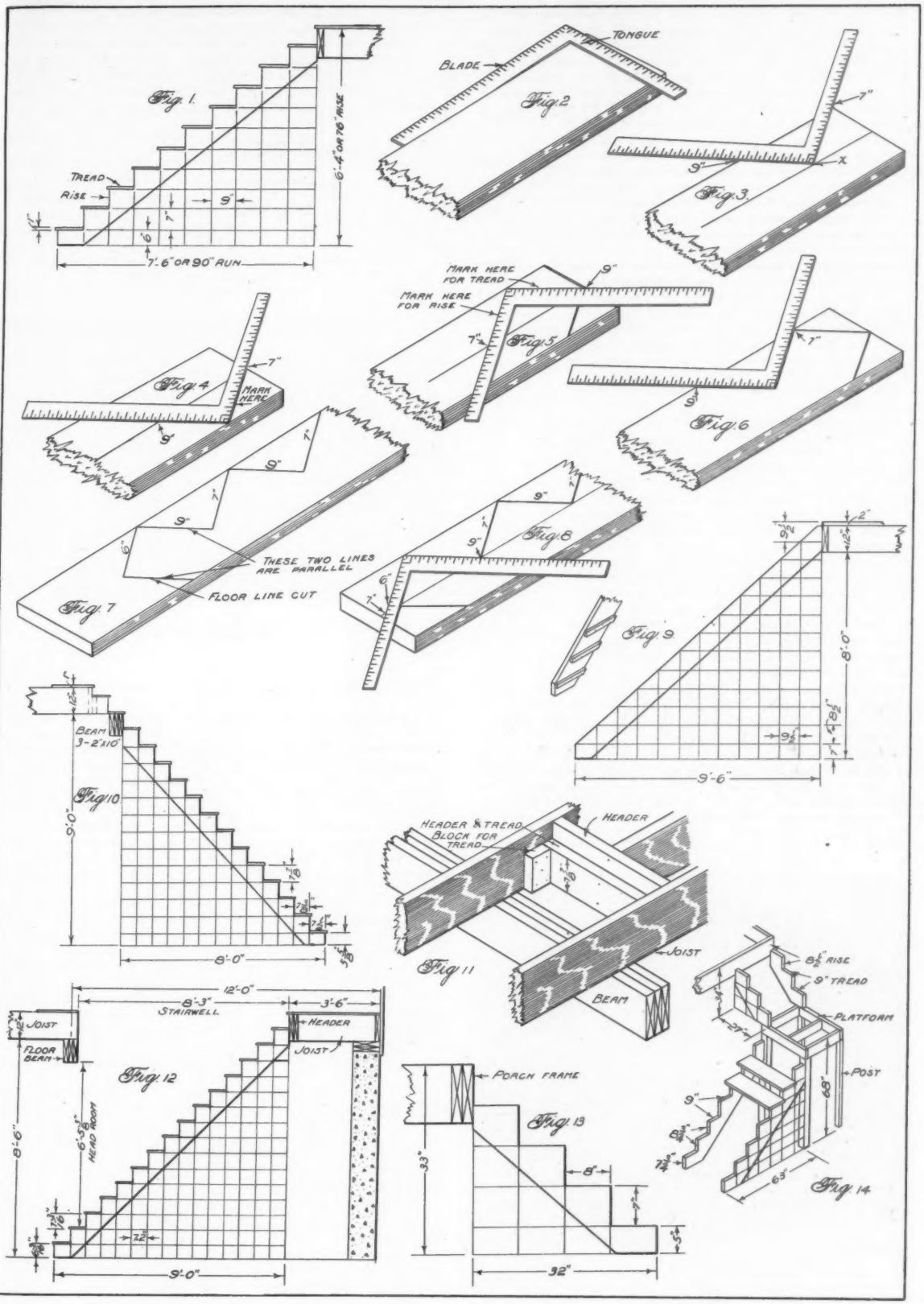


Fig. 1
TREAD
RISE
9"
7"
6"
7'-6" OR 90" RUN
6'-4" OR 76" RISE
Fig. 2
TONGUE
BLADE
Fig. 3
7"
9"
X
Fig. 4
7"
MARK HERE
9"
Fig. 5
MARK HERE FOR TREAD
MARK HERE FOR RISE
9"
7"
Fig. 6
7"
9"
Fig. 7
7"
9"
7"
9"
6"
THESE TWO LINES ARE PARALLEL
FLOOR LINE CUT
Fig. 8
9"
7"
9"
6"
7"
Fig. 9
9½"
2"
8'-0"
9½"
9'-6"
Fig. 10
BEAM 3-2"x10"
9'-0"
6'-0"
Fig. 11
HEADER & TREAD
HEADER
BLOCK FOR TREAD
JOIST
BEAM
Fig. 12
12'-0"
8'-3"
STAIRWELL
3'-6"
JOIST
FLOOR BEAM
HEADER
JOIST
8'-6"
6'-3"
HEAD ROOM
9'-0"
Fig. 13
PORCH FRAME
33"
8"
32"
Fig. 14
8½" RISE
9" TREAD
PLATFORM
27"
POST
68"
9"
8½"
7¾"
6'

NUT BOWL

Paul N. Wenger, Lebanon High School, Lebanon, Pa.

The nut bowl shown in the accompanying illustrations is a practical problem for the wood-turning students. It is a simple form of faceplate work which may be accomplished with comparative ease. After the boy has once completed several small lathe problems, he is in line for a project of this type. The inlay may be omitted if so desired. However, since the inlay improves the appearance of the project immensely, it is considered unwise to omit it.

This project may be made from a single piece or from glued stock. As the amount of material used is rather small, a wood of good quality should be selected. The nut bowl shown in the accompanying photograph was made from Oregon myrtle. This wood is hard and takes a beautiful natural finish. The stock required for this project is 2⅜ in. thick and 9½ in. in diameter.

After selecting the stock, plane one surface and fasten the block with this surface to the faceplate. Care must be taken to select short screws so that they do not pierce the base when the bowl is hollowed out. The stock may then be turned to the proper thickness and diameter. A groove ¼ in. wide may next be made to accommodate the inlay strip. The inlaying should be done before the project is cut to the given design.

The inlaying process is very simple. Select a strip of inlay that is suitable for the project and cut it to the proper length, allowing ¼ in. for the overlapping seam. The ends of the inlay should then be tapered so as to overlap without increasing the thickness of the inlay. After placing glue upon the inlay and into the groove, the inlay strip may be properly placed. A small hand screw tightened across the project with one jaw holding the seam in place will suffice for clamping.

After allowing 24 hours for the glue to dry, the hand screw may be removed. The holes for the nut picks should be bored before cutting the project to the given design. This will eliminate the danger of splitting the end grain of the wood. After the holes are bored and the inlay has been glued, the project may be cut to the given design. In sanding, care should be taken to keep the edges sharp. This adds greatly to the appearance and workmanship of any project. Any natural finish may be used.

A decalcomania transfer of good design adds to the beauty of the article. These transfers may be purchased at any of the manual-training supply houses. Full directions for the use are given with each transfer.

After removing the project from the faceplate, the base of the bowl may be covered with felt. This may be done as follows: Apply three coats of shellac to the base (allowing five minutes between each successive application), cut the felt slightly larger than the base, place the felt upon the base, allow several hours for drying, and trim the felt to size with a sharp knife.

THE FINISHED NUT BOWL

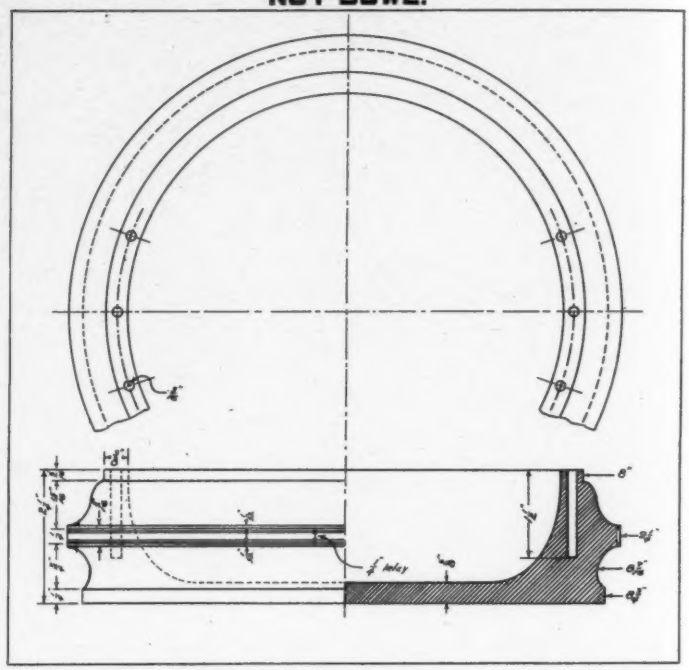
POLYCHROME IN THE SCHOOL SHOP

A. E. Gray, Stockbridge, Mass.

"The friends thou hast, and their adoption tried,
Grapple them to thy soul with hooks of steel."—*Shakespeare.*

Thanks to an awakened consciousness of the rights of the boy and the girl. The teacher of the industrial arts has become a modernist in the interpretation of these lines of the "Bard of Avon." Once "manual training" meant woodwork, taborets, footstools, tables, and toys.

NUT BOWL.



These "old friends" too long had been "grappled to our souls with hooks of steel." Yet they still have and always will have a place, and serve a purpose, and are by no means to be discarded and relegated to the scrap heap of the obsolete. But we do appreciate now the narrowness of such a course designated as "manual training" in the light of the needs and legitimate demands of the public for whom alone the school exists.

In the woodworking shops of our schools, any medium that will create a new interest, develop manual dexterity, produce taste and discrimination in artistic creation, and at the same time contribute to the production of a useful, practical article is necessarily fulfilling a long-felt need.

Many of the old lines of hand-craft in vogue before the days of modern machinery, and now almost forgotten, are being revived. Attics, long unused, again hum to the music of the hand loom and the noise of saw, plane, and hammer, as the fathers and mothers of our American schoolboy and girl are getting back to the primitive. It may be partly a fad, partly due to the high cost of much of the home furnishings, and partly to the mere love of creating. For the children in the schools, hickory splints, rush, fiber bristle, reed, rags, and yarn, as well as music, art, and literature, have been added to the curriculum and a new era has dawned for the boy or girl seeking the fundamentals of an education that will develop simultaneously the hand, the heart, and the mind.

The thing a boy creates in the school shop should do more than supply a physical need. A stool upon which to sit, or a bowl from which to eat, can, and should, satisfy the aesthetic and spiritual as well as the utilitarian needs. From time immemorial man has endeavored and found delight in making beautiful the things which are also of practical use, and the degree of cultivation of a people is always reflected in the degree of success of this endeavor.

In the factories which produce small novelty goods such as picture frames, candlesticks, sconces, book ends, and racks, the old art of polychroming has been revived.

This polychroming is readily adapted to the ordinary elementary-grade shop and the junior high school, where the pieces can both be built up and the finish applied.

Polychrome, from the Greek *chroma* and *polys* means, literally, many colors, and is sometimes, as a process, referred to as Italian Renaissance decorative art. Decorative art is that form of art having

for its purpose the appropriate adornment of some utilitarian object, thereby adding to its beauty but not, necessarily, to its usefulness.

For finishing projects in polychrome in the school shop, first of all necessarily will come the woodwork. Hence the opportunity for the teaching of the commonly accepted fundamentals of woodwork. The construction of the box, the candlestick, placque, telephone screen, book ends, picture frame, etc., will require the same exactitude as any other finish would require with the single exception that the sanding need be only roughly done. Under no consideration should the fact that the woodwork will be covered up be an excuse for faulty, slouchy, or too hurried work. Such practice would, of course, be abominable as it would tend to defeat one of the primary functions of a course in manual arts, namely, that of inculcating in the student a true sense of beauty, solidarity and honesty.

In addition to wood, other material can be readily utilized such as beaver board, plaster board, and many other built-up composition boards that are available. In fact many of these are superior to much of the poorly seasoned wood often found in the school shop.

After the project has been built and roughly sanded, a coat of shellac may be applied to new wood to prevent the absorption of the

SOME EXAMPLES OF POLYCHROME WORK

oil in the plastic coat to follow. For this plastic clay there are various trade names such as Persian clay, gesso, stipplecoat, stipaleen, and others. Most of these can be had in three grades—liquid, semiliquid, and paste. Each serves a special purpose, the first two being merely fillers, the latter for relief work, molding and filigree work. Most of the plastic clays now obtainable are superior to plaster paris or stucco. They are more durable, will not chip, and are easier to mold as the material does not set so rapidly, and when dry has greater elasticity, so that it may be sanded to a satin smoothness if desired.

Another advantage of the modeling clay is that through its chemical ingredients it is able to resist the solvent properties of lacquer, thus allowing the application of a finishing coat of colored lacquer over the molded surface.

The clay is applied with an ordinary brush. With a little practice, many attractive designs can be obtained. An attractive effect may be obtained by first applying a liberal coat of clay over a small surface, then crowding the brush at right angles to the surface into the clay and give a half-right then a half-left turn alternately, lifting the brush sharply at the conclusion of each turn. Stippling with the end of the brush also is effective. Other effects are produced by the use of an artist's palette knife or spatula.

After the clay has been thus applied and suitably molded, allow it to stand until thoroughly hard. This will take from ten to twenty hours, depending upon the atmospheric conditions. Next, mix a bronzing powder with lacquer for the second step. This powder can be had in bright gold, old gold, Roman gold, copper, silver, and a number of others. There are two methods of applying the bronze. First, if the clay used is precolored (it can be had in the natural color or tinted to any color desired) all that is necessary is to make a wad of unbleached cotton cloth, dip this in the prepared bronze and go over the clay surface gently. The valleys will thus be left natural (or tinted as the case may be) while the bronze will adhere to the raised portions. By the second method, the clay being neutral, apply the bronze with a brush, covering the entire surface, both the depressions and the raised portions. Allow this to stand until dried properly. Now apply a coat of ordinary oil color of the desired shade, and after half an hour rub lightly with a wad of cloth. This leaves the color in the depressions only while the bronze remains, slightly tinted on the elevations. Either method finally produces the same results. It is suggested that the neutral clay be used as the pretinted commercial clay is more expensive. The last step is optional and consists either of a coat of preserving lacquer or a dusting on of a prepared antique powder to give the proper aged or antique appearance.

To summarize, the steps to apply a polychrome finish in the school shop are as follows:

1. Construction of the piece from wood or other material. This should be roughly sanded.
2. Apply one or two coats of shellac.
3. Apply the clay, using a brush or a spatula.
4. Apply the bronzing liquid.
5. Coat the clay with the desired color, unless tinted clay is used.
6. Apply a finish coat of shellac, lacquer, or powder.

A visit to an art store, a window-shopping tour, or an hour in a department store will supply material for new ideas for polychrome work.

The illustration accompanying this article suggests some very simple projects for the elementary and junior-high-school shop. For more advanced classes, there are such pieces as turned floor lamps, desk and boudoir lamps, buffet and dresser mirror frames, smoking stands, and pedestals.

Polychroming provides for the school shops a very fine seasonal activity, as the pieces so finished make exceptionally attractive Christmas gifts, or gifts for other occasions. The work affords the student much pleasure, and an opportunity to acquire dexterity and artistic taste.

ART AND MANUAL TRAINING — LAMP STANDARDS AND SHADES, PART 3—ELECTRIC BATTERY CANDLE LAMP

C. Anthony Van Kammen, Grand Rapids, Michigan

The design shown in Figure 1 is similar in construction to the lamp standard shown on page 183 of the May, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE, except that a handle has been added. It serves well as a seventh- or eighth-grade problem. No lamp shade is used with this lamp, but a reflector may be provided to throw the light away from the person carrying it if so desired. The base must be built up of two pieces of stock, the lower half to be cut out to receive the battery and switch. For high-school classes, the designs shown in Figures 2 and 3 may be used. They are very good projects for the turning class, as they introduce between-center, faceplate, and mandrel turning.

For making a lamp according to design A, the base is constructed as shown in the working drawing, Figure 1. The battery "well" must be cut into the lower section, before the two sections are glued together. This well measures 2 by 3 in., and one end must be rounded as shown in Figure 7. With the outline of the well laid out, draw a line $\frac{1}{8}$ in. inside all the way around. Using a No. 6 auger bit, the point placed on the inner line, bore holes at the corners and all along the inner line adjacent to each other. This will remove the wood from the well. Or holes may be bored at the corners only and a coping saw or compass saw used to cut to the outside line. With a chisel and gouge, smooth up the sides of the battery well. After the base is glued up it is planed to shape by the method described and illustrated in Article No. 1, Figure 2. (Page 184, May, 1928, issue, INDUSTRIAL-ARTS MAGAZINE). Lay out the well with the long sides with the grain of the wood.

Cut the shaft to length in a miter box and taper as required. In boring the ⅜-in. hole in the ⅜-in. thick cap, use a No. 6 gimlet bit first so that the piece will not split. Follow with the No. 10 auger bit. Place the wood in the vise, the grain parallel with the vise face so that the chance of splitting the piece will be minimized. The hole in the cap should be filed slightly tapering so that the socket will fit snugly. Bore the hole in the shaft from the top end ¾ in. deep, using a No. 10 auger bit. Follow with a No. 6 auger bit through the length of the shaft. After boring a ⅜-in. hole through the center of the base, fasten the shaft to the base with 1¼-in. brads driven in slightly at an angle.

The molding at the base of the shaft is made and put on as described and shown in Figure 3 of the first article. The handle is cut out with a coping saw, holes being bored at all the turns with a No. 8 auger bit. Scribe the location of the handle on the base and chisel a recess to receive it. Attach the handle with glue and brads.

The lamp is now ready for the installation of the electric wires, socket, switch, and battery terminal contacts which are attached to the wires. The sockets are like those used for Christmas tree lighting and are very inexpensive. The terminal contacts for the wire leads on the socket are made from strips of thin brass or copper. (See Figures 4, 5, and 6.) Small three-cell flash-light batteries are used. Figure 7 shows the battery in place in the well.

The surface decorations may be similar to those used and illustrated in Figures A, B, C, D, E, and F, of Article No. 1. Another very satisfactory finish is to give the problem with recessed or raised panels, two or three coats of shellac after which the gilt may be applied. When dry, tone the gold with burnt sienna paint which gives an oxidized or antique effect. Be careful not to get on too much paint. Stipple the color, leaving the corners quite dark, and blending off into the gold. The final dusty effect is produced by brushing the object with a mixture of rottenstone and water, to which has been added a little glue as a binder. Wipe off the surplus with a small piece of waste wadded up in a piece of cloth. Sufficient powder will stick to the lamp to give the desired effect.

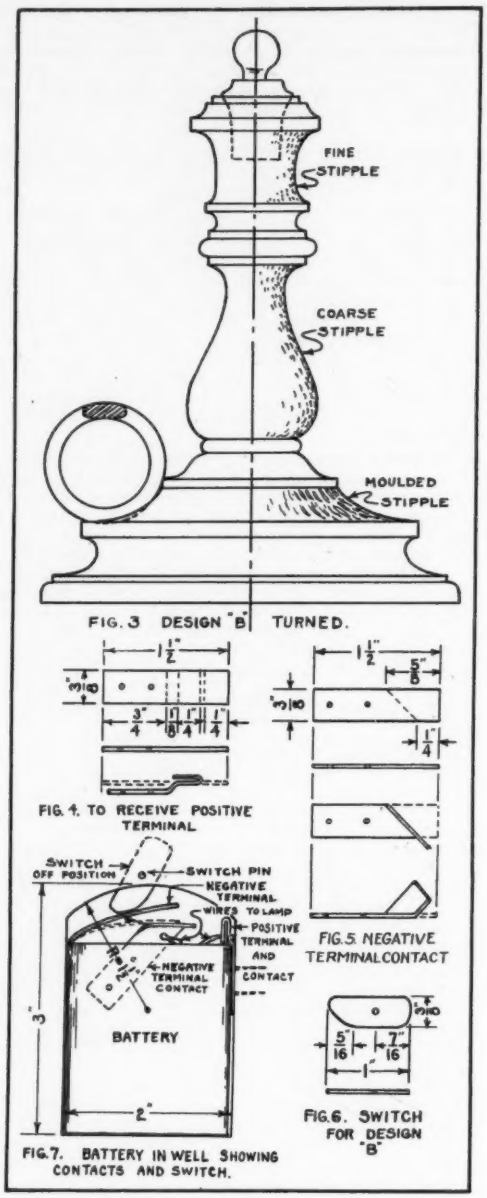
Raised panels may be cut from cardboard and glued in place. After the piece has been given two or three coats of shellac, the panels may be stippled with a product similar to gesso or stippalene. This stippling compound can be made by mixing ordinary powdered chalk in orange shellac forming a paste of proper consistency. Too much powder and not enough shellac will cause the stipple to chip. The compound offered makes a very cheap and satisfactory material for polychrome surfaces of floor and table lamps, boxes, etc. It may be applied with a brush, may be molded quite satisfactorily, adheres to varnished surfaces because of the shellac varnish; hence, it may be used to give the raised Chinese effects used on much of the present-day furniture.

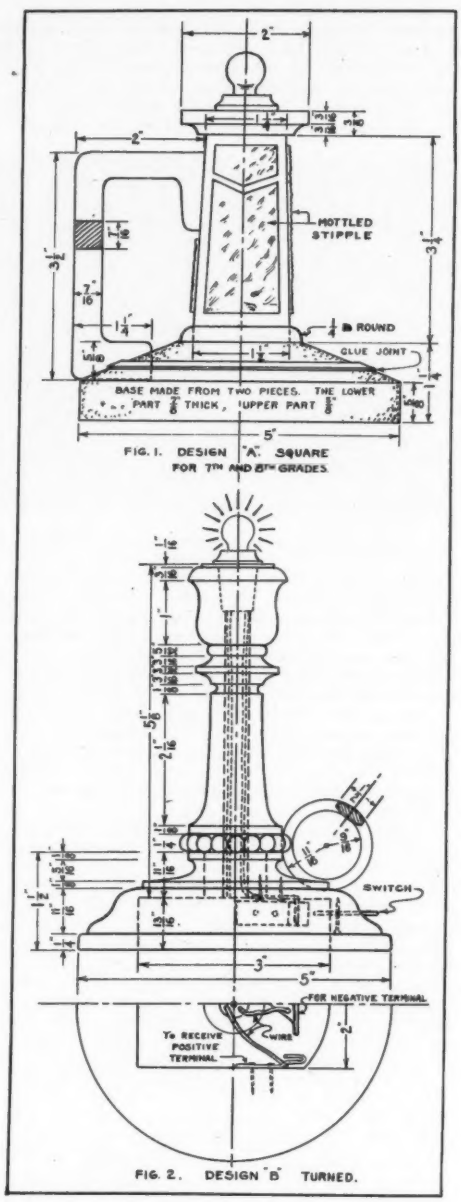
RADIO TABLE

E. M. Winterbourne, Skinner Junior High School, Denver, Colorado

Many people who have radio sets of the small box-cabinet type would welcome a suitable table on which to place it. A space for the A and B batteries, and the charger is also needed.

This table has been worked out to accommodate a set from 24 to 30 in. long, but the dimensions may be easily changed to accommodate a set of any size. It may be necessary also to change the size of the battery compartments slightly, as batteries and chargers vary somewhat in size.



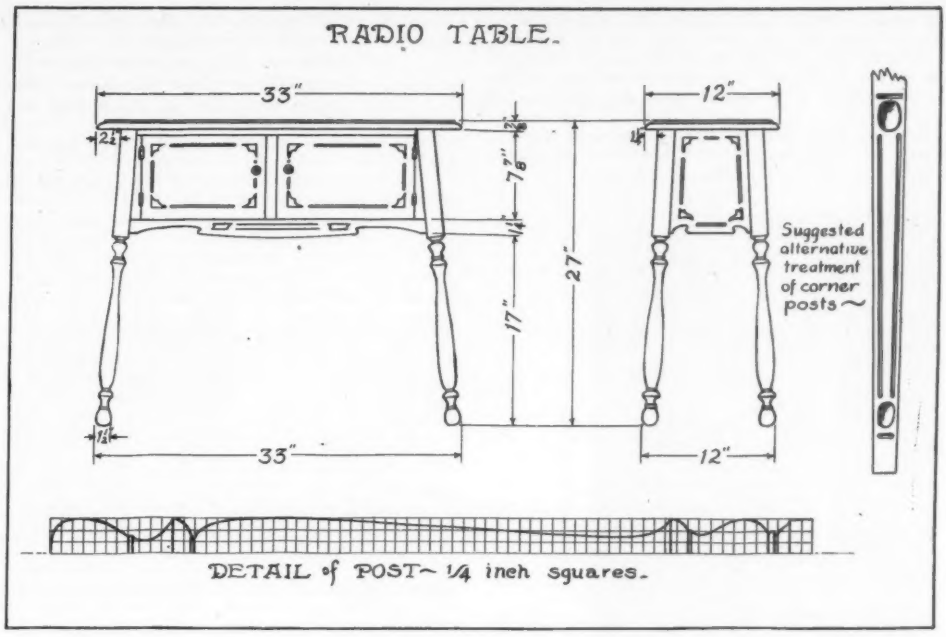

MOTTLED STIPPLE
ROUND
GLUE JOINT
BASE MADE FROM TWO PIECES. THE LOWER PART THICK, UPPER PART
FIG. 1. DESIGN "A" SQUARE FOR 7TH AND 8TH GRADES
SWITCH
FOR NEGATIVE TERMINAL
To RECEIVE POSITIVE TERMINAL
WIRE
FIG. 2. DESIGN "B" TURNED.

ELECTRIC BATTERY CANDLE LAMP, DESIGNED BY C. ANTHONY VAN KAMMEN

The turned designs are given only as suggestions and should be varied by the student. The principal dimensions are given in Figure 2. How to do the turning is left to the instructor. Wire the turned lamp the same as the square style. When decorating, portions of the turned shaft and base should be stippled while other parts may be left smooth. Very beautiful color effects in combination with gold should be used to decorate the surface. Many color suggestions may be obtained by a study of polychrome lamps in the furniture stores and art departments. Do not forget the suggestions and help that can be had from the art teacher.

The table may be made of any good cabinet wood, such as oak, walnut, or mahogany. It is very attractive if finished in the duo-tone or two-tone effect. It also looks well when finished in the popular brushing lacquer. In case the lacquer finish is used, poplar or birch may be utilized instead of the more expensive hardwoods. The ends and doors may be decorated with borders of inlay, veining, or decalcomania transfers, or the accents may be carved in the corners, as shown in the drawings.

The corner posts shown in the drawing are turned, but the table also appears very attractive with the square tapered posts shown as an



alternative. The fluted and carved recesses are easily done with sharp carving tools, and are very effective when the elliptical recesses are colored a dull blue, and the flutings, old gold. In carving the legs, make the recesses as smooth as possible with a sharp tool. A carving should never be sandpapered however, as this takes all the character out of the work.

Solid knobs of old copper or old brass, and with a simple filigree or a modeled pattern are most suitable for the doors. The doors may be fitted with friction catches or locks, as desired. In installing friction catches, the striker member should be fastened in the door, while the spring member should be fastened into the frame. It is a very common mistake in school shops to install them in the opposite way, resulting in an unsightly marring of the door frame.

HALL TREE

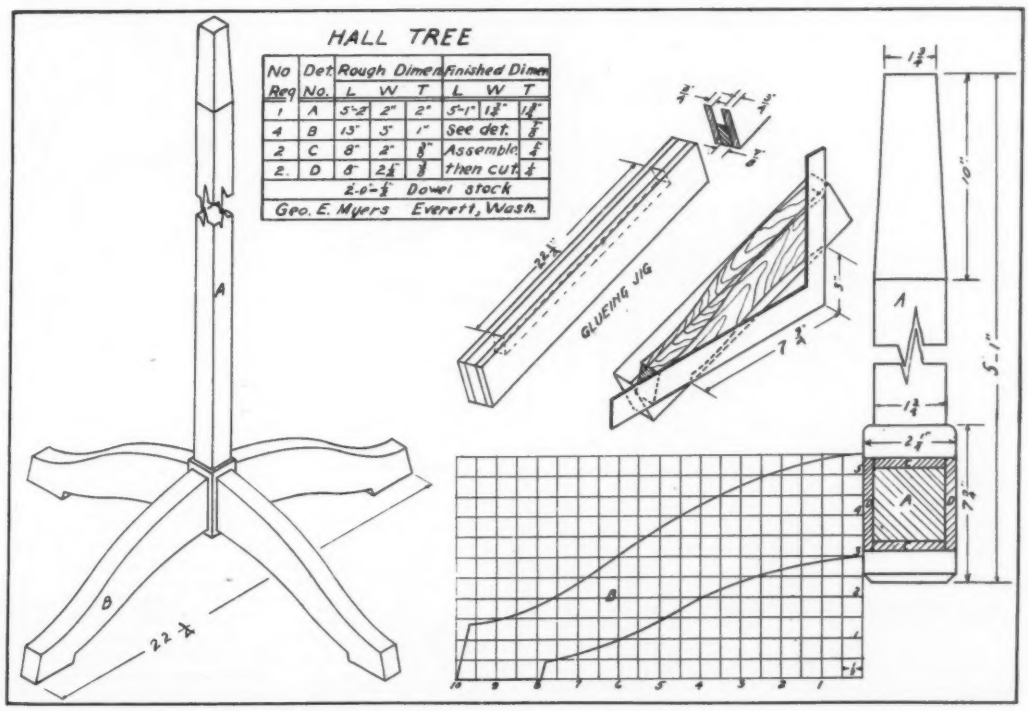
Geo. E. Myers, Everett, Wash.

Although hall trees are no longer in general use, occasionally a design for one is wanted. In Figure 1, a simple design is offered which will not be out of place with modern furniture. It uses several principles not usually found in projects, such as use of the steel square in laying out cuts, choosing the direction of the grain in a piece to gain strength and save material, and use of a jig in gluing.

The piece was made with a dowel joint. If a mortise and tenon is to be used, it will be necessary to make some changes.

Suggested Procedure

1. If the four feet are worked out step by step together, time will be saved and the necessary accuracy gained.
2. Square up four pieces of stock for the feet but do not cut to length.
3. Lay the square on the piece as shown in the drawing and scribe a line along the tongue and blade. This gives the proper angle for the joint and also for the part that rests on the floor.
4. Square across the edges with the try-square.
5. With the sliding T bevel, which may be set from the draw-


HALL TREE
No Req | Det No. | Rough Dimen L W T | Finished Dimen L W T
1 | A | 5'-2" 2" 2" | 5'-1" 1⅞" 1⅞"
4 | B | 13" 3" 1" | See det. ⅞"
2 | C | 8" 2" ⅜" | Assemble ¼"
2 | D | 8" 2½" ⅜" | then cut ¼"
2-0-½" Dowel stock
Geo. E. Myers Everett, Wash.
A
B
22½
GLUEING JIG
10"
5'-1"
7⅞"
1¾
2½"

ing and the try-square, scribe the other straight lines as shown in the drawing.

6. Saw along the lines, after testing the accuracy of the layout.
7. Draw the design of the foot on squared paper and transfer to each of the four pieces. A pattern of heavy drawing paper will save time.
8. Saw along the curved lines and dress the top edges smooth.
9. Now lay out and bore two holes in each foot for ½-in. dowels.
10. Square up the stock for the post.

FIG. 2. JIG USED FOR GLUEING JOINTS

11. Glue two pieces of ¼-in. stock to opposite sides of post.
12. Dress the four edges flush with the post and repeat above operation on opposite sides of the post.
13. Square around the top and bottom ends of these pieces and finish according to drawing.
14. Lay out and bore holes for dowels, boring from each side to the middle.
15. A jig, such as shown in the drawing will insure accurately glued joints. After the jig is in place it will be necessary to adjust the joints by means of a wedge inserted at the end of one of the feet. When this wedge is pulled it will allow the removal of the jig. The method of clamping is shown in Figure 2.

CALENDAR AND STAMP CONTAINER

Leon H. Baxter, Western Reserve Academy, Hudson, Ohio

This is a handy little article for a desk made to hold stock-size calendar cards.

The choice of wood is optional but black walnut is ideal for this article.

A block 2¼ by 3¾ by 3¾ in. is first cut to size, with the grain of the wood running parallel to its base.

A free-hand curve is drawn, similar to the one shown in the drawing and then sawed, spoke-shaved, and filed to a graceful outline.

The opening for the drawer is made next. Measure up from the bottom edge $\frac{7}{16}$ in. and draw a line parallel to the base. Measure 1⅜ in. left and right from a center point on this line which will represent the length of the drawer opening. The width of the opening is obtained by using a $\frac{11}{16}$-in. bit, and boring holes on this center line to a depth of 1⅞ in. A depth gauge should be used on the bit to insure uniformity of depth, and the wood should be placed horizontally in a vise and fastened securely while the boring is done to prevent any danger of splitting.

Using a ½-in. chisel, carefully square out the drawer opening in a neat and workmanlike manner.

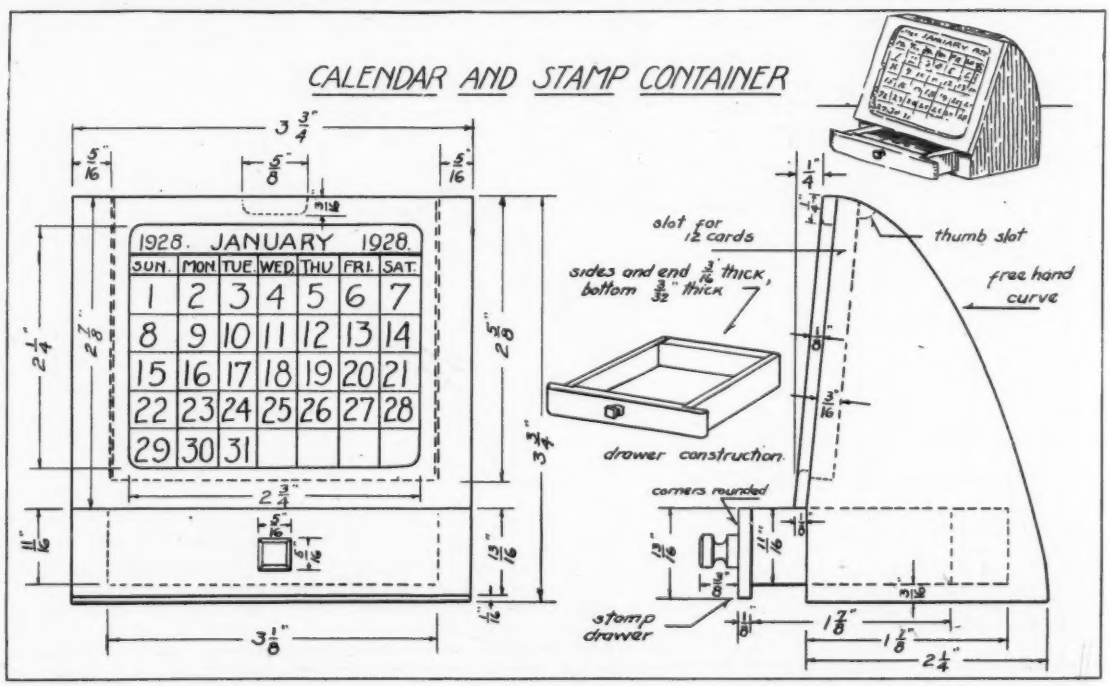
Slope the front of the project as shown in the side view of the drawing.

Plane this flat and smooth. From the upper edge, measure down 2⅝ in. and square a line across the face of the work. Square lines down from the top to the line previously drawn $\frac{5}{16}$ in. from each side. This outlines the slot for the monthly calendar cards. Score these lines carefully and deeply with a sharp knife, using a try-square blade for a straight-edge. Carefully chisel this slot out smoothly to a depth of $\frac{3}{16}$ in., as shown.

The front frame for this opening is made ⅛ by 2⅞ by 3¾ in. From the upper edge of this piece measure down ¼ in. and from this point lay out the opening 2⅜ by 2¼ in. with inner corners rounded to a $\frac{3}{16}$-in. radius. Bore holes for these corners with a ⅜-in. bit and saw out the opening with a coping saw. Smooth and round the edges with a file and sandpaper. With a knife and file, cut out a thumb hole $\frac{3}{16}$ by $\frac{3}{16}$ by ⅜ in. on top of the main piece, where shown. The front frame should be attached to the main piece with glue and a few ½-in. No. 18 brads. These should be slightly set into the wood and the holes filled with beeswax.

The drawer construction is clearly shown in the detail sketch. The drawer is made to fit snugly into the opening, with the front piece coming flush with the sides and bottom edge of project. A drawer pull is next made similar to the one shown in the drawing using a knife and a file. It is attached to the drawer front with glue and a ⅜-in. No. 18 brad.

Sand all parts smooth with No. ½ sandpaper, finishing with No. 00. For walnut, give a hot-linseed-oil finish, well rubbed in. Glue a neat piece of felt to the bottom.



CLEANING THE OIL STRAINER

Ray F. Kuns, Cincinnati, Ohio

Figure 1 shows an oil screen which was found to have a large hole in it after it was removed and cleaned. The bearings of the engine having this screen were in very bad condition. The screen, when taken out, was filthy with dirt formed from carbon and other dirt or dust particles and even particles of babbitt and other metals. The screen was intended to hold out or filter out this dirt. With the hole in the side of it, these foreign particles were on the inside. The condition of the bearings attested to the fact that similar particles of abrasive materials had gone through the oil pump and oil lines.

The hole was doubtless caused from the sulphurous acid which may be formed in the crankcase under proper conditions of fuel dilution and water condensation. The repair is, of course, simple. Solder on a new piece of copper or brass gauze, as shown in Figure 2.

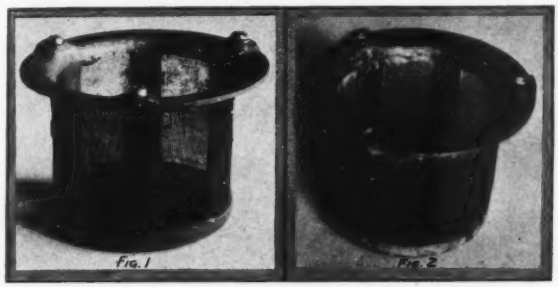


Fig. 1 shows a broken oil screen which admits dirt to the oil lines. The oil screens should be cleaned at least once a season.

Fig. 2 shows the oil screen after it had been repaired by soldering a new piece of copper or brass gauze in place.

SECOND-YEAR MECHANICAL-DRAWING TEST SPUR GEARING

August Flam, Los Angeles, Calif.

Directions: Write the correct answers in the spaces left blank in the following statements.

1. The ....., the ....., and the..... of an involute-cut spur gear must be given in three place decimals.
2. The addendum of a gear tooth is.....than the dedendum.
3. The clearance is equal to the difference between the..... and the.....
4. The usual angle of pressure on involute-cut spur-gear teeth is.....
5. A spur gear is in mesh with its rack when the pitch circle of the gear is.....of the rack.
6. The circular pitch of a spur gear in terms of its diametral pitch is equal to.....
7. The diameter of the base circle of a spur gear is less than the diameter of....., but greater than the diameter of.....
8. The face of a spur gear usually is.....than the length of its hub.
9. What is the pitch diameter of a spur gear having 72 teeth and 8 diametral pitch?
10. What is the diametral pitch of a spur gear having 96 teeth and 6-in. pitch diameter?
11. What is the number of teeth in a spur gear having 4 diametral pitch, and 12-in. pitch diameter?
12. If a spur gear has 36 teeth and 9-in. pitch diameter, what is the outside diameter?

CHECKING LIST FOR SPUR-GEARING TEST

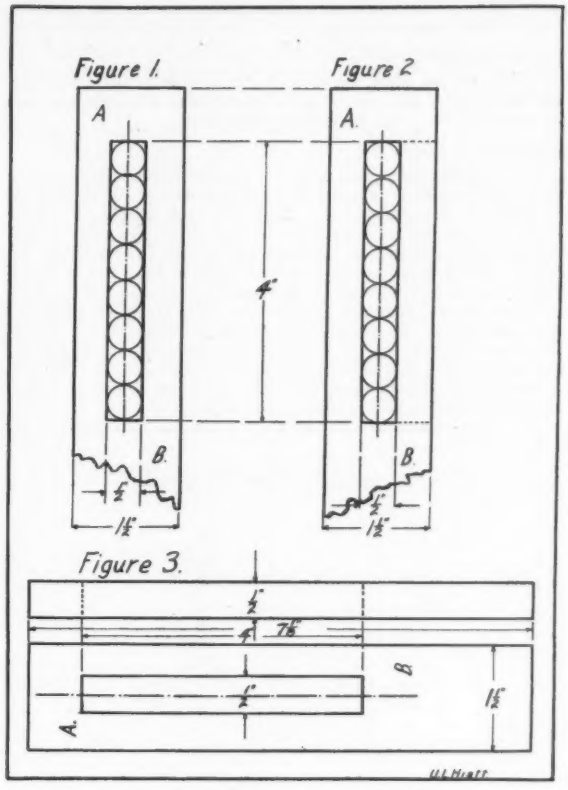
1. pitch diameter, root diameter, outside diameter.	7. pitch circle, root circle
2. less	8. less
3. addendum, dedendum	9. 9 in.
4. 14½ deg.	10. 16
5. tangent to the pitch line	11. 48
3.1416	12. 9½ in.
6. ———	
D. P.	

MORTISING MADE EASY

U. L. Hiatt, Director of Manual Arts, La Junta, Colo.

A very easy way to do mortising quickly and accurately is to provide the jig shown in Figure 3 of the accompanying illustration. Figures 1 and 2 show how the mortising block is applied to the two faces of a table leg.

Assuming the leg to be 1½ by 1½ in., the curtain to be of 1-in. material, we may easily saw a ½-in. tenon and leave a ¼-in. shoulder. The piece shown in Figure 3 is made to the width of the leg. It can be clamped quickly to the leg with the bench vise. The holes for the mortise, should then be bored close together, as this will greatly aid in shaping the mortise with a chisel.



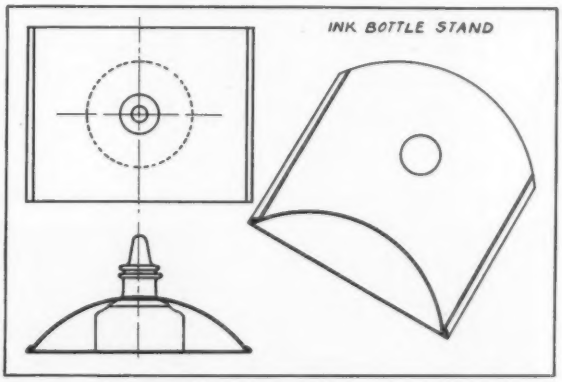
MORTISING JIG

The use of this device speeds up the making of mortises considerably.

INK-BOTTLE HOLDER

Harry W. Kroll, High School, Buhl, Minn.

The spilling of the ink is not always the work of the careless student. The four-ounce bottle is very light and unless the stopper is pushed down tightly, a slight knock will not only turn over the bottle, but will spill the ink as well. By the use of the stand, the bottle will be kept upright and the student will be aided in taking out the stopper in filling the pen.



If brass is not available, tin plate, sheet iron, or material from tin cans, heavy enough not to loose its spring, can be used.

HOW TO MAKE LIGHTING FIXTURES FROM BOTTLES

Part II

C. M. Rice, North Junior High School, Everett, Wash.

The Little Brown Jug.

If the enthusiastic collector, while looking through the assortment of bottles in the dingy junk shop, should fail to find the bottle which

he desires, he should not leave the store in despair. Further search may disclose a brown vinegar jug or perhaps a stone bottle, which may be borne away in triumph.

The Jinni Comes Forth.

With the jug safely deposited on his workbench, and with a few tools, the collector sets free the good Jinni—Light! who with his cheerful smile may make the home happy ever after.

Materials and Methods.

The common vinegar jug (Fig. 1) may be finished with enamel, bronze paint, gesso or lacquer. If the jug is opaque, the finish must be placed on the outside, but if the jug is made of glass, a colored lacquer may be applied to the inside surface of the jug. This is done by pouring the lacquer into the bottle and allowing it to run over the surface. The base of the jug or bottle should be filled with a cement mixture, as shown in Figure 2, if there is any danger of the lamp being top heavy. A turned wooden base will add to the appearance of the lamp as is evident from an inspection of Figures 3, 4, 5, and 6. The electric fixture (Fig. 2) is held in place by a wooden plug in the neck of the bottle, but when a base is used, a piece of ⅛-in. pipe may be attached and extend upward to hold the socket as well as help to hold the bottle rigidly in place. (See Fig. 6).

How to Drill the Bottle.

The bottle or jug may be drilled by hand with an ordinary drill placed in a brace. Turpentine should be applied as the drilling progresses. The glazed surface must be first cut with a three-cornered file broken clean at the ends. The file should be tapped lightly with a hammer while rotating it.

Regarding the Shade.

Such details as shape and texture of the shade should be kept in mind while making the lamp. If a stone jug is to be left in its rugged state without finish of any kind, the shade should carry out the same idea as regards texture.

A BLUE-PRINT SOLUTION

Charles A. Wardner, Jackson, Michigan

The following solution is commonly known as the Dr. Nichols' Solution:

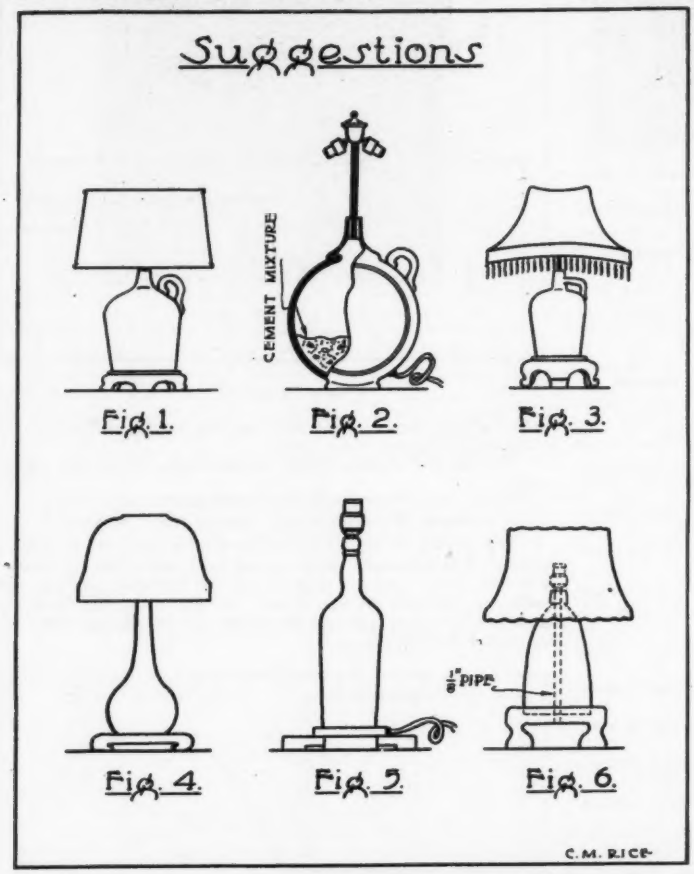
Solution A

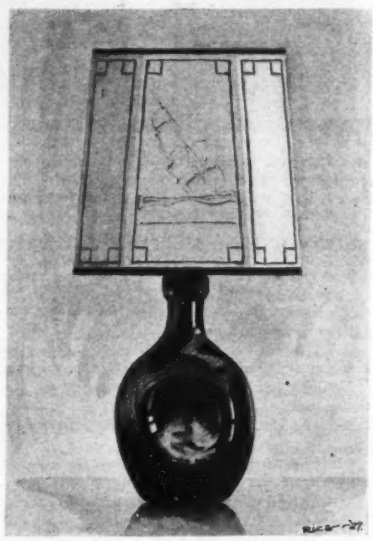
Ammonia—Citrate of iron	1½ oz.
Water	2 oz.

Solution B

Potassium ferrocyanide	1⅛ oz.
Water	2 oz.

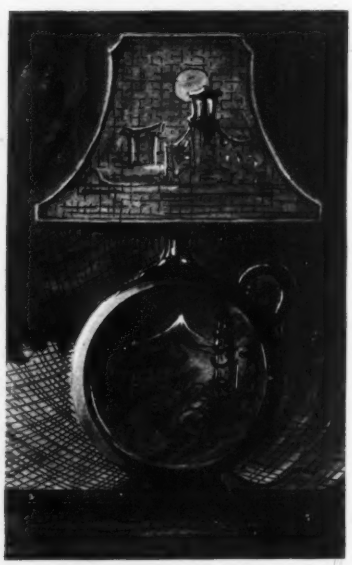
Just before using mix together one part of A and B and add two parts of water.





PINCH BOTTLE

GLASS AND STONE BOTTLES

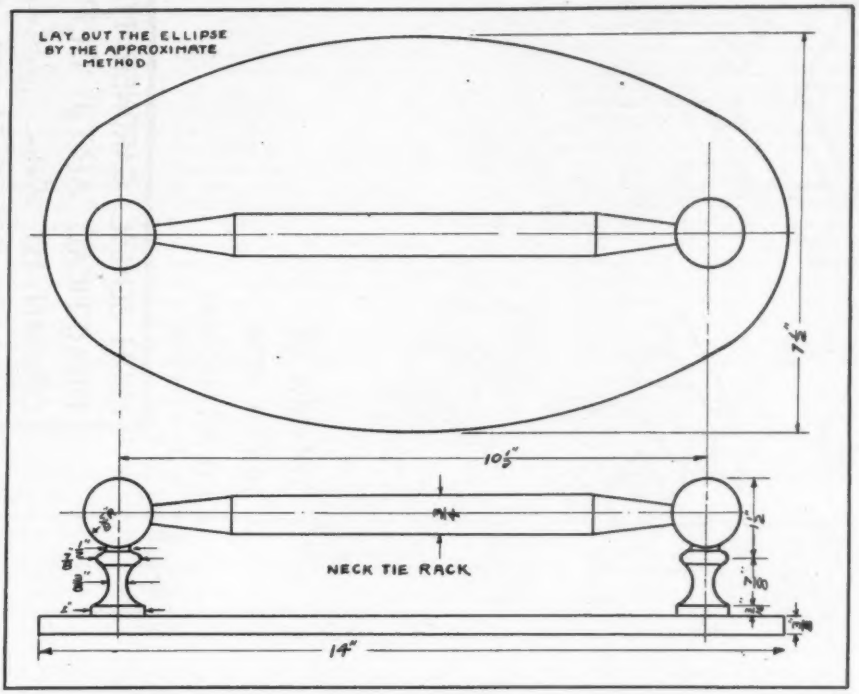


STONE BOTTLE

NECK-TIE RACK

Leon A. Orr, Junior High School, Bennington, Vt.

The neck-tie rack described herewith is a piece of simple turning. The oval back is to be covered with cretonne to match the furnishings of the bedroom. The rack may be supported by a ribbon or chain.



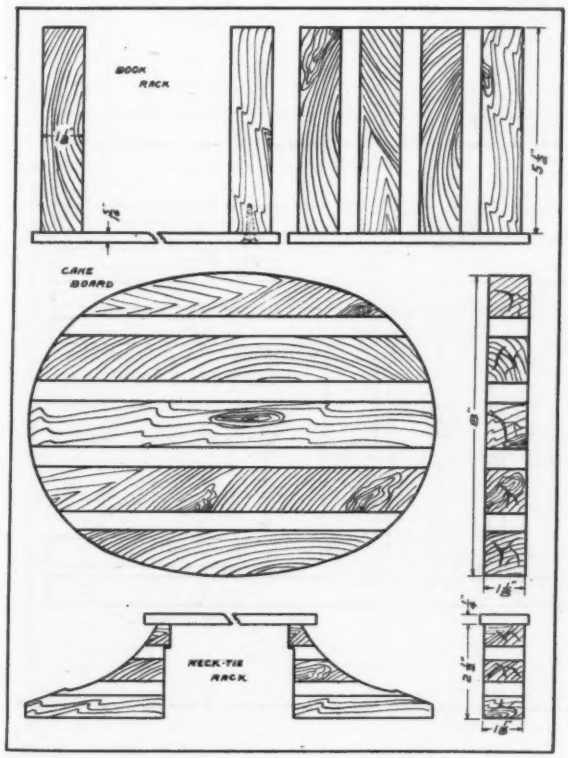
RECLAIMING SCRAP WOOD

Jerome F. Derwallis, Newport, R. I.

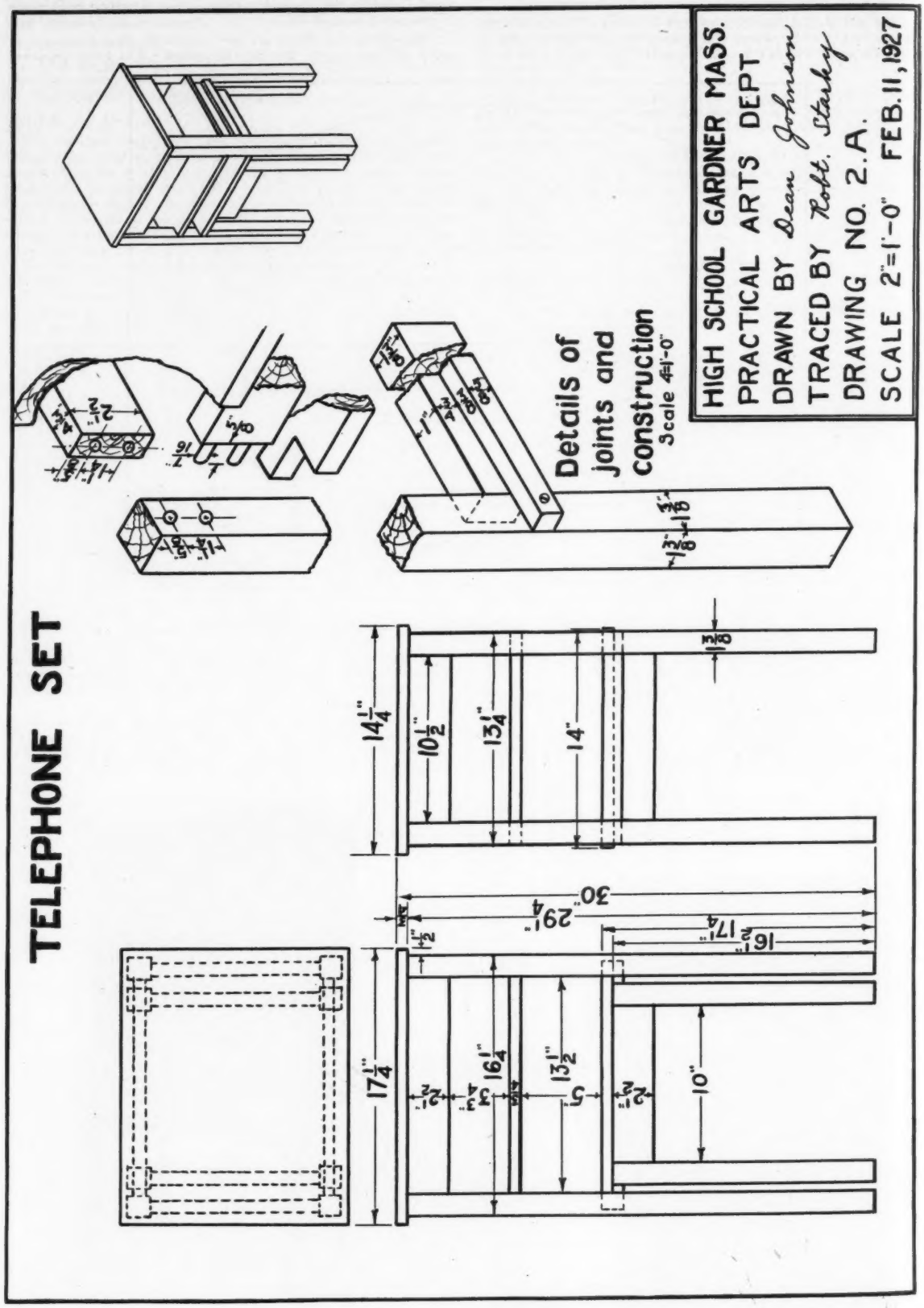
The drawings here suggest several ways of utilizing wood from the ever-filling scrap box. Pieces of assorted varieties such as gum-wood, whitewood, spruce, mahogany, redwood, cherry, etc., when glue-joined in varying thicknesses and shades, effect a pleasing combination of contrasting natural colors.

Massiveness and solidity are easily secured by using scrap wood of widths sufficient to give the thickness desired. The pieces are sawed to an even width in order to facilitate planing after the blocks are glued. Since the pieces are parts of mill-planed boards and inasmuch as the pieces are glued sideways, considerable work is thus saved in obviating the necessity of jointing.

The built-up blocks can then be planed and shaped as desired. White shellac should be used to preserve the colors and stripes. The cake board needs but one coat. The bookrack may be given three coats, the last being rubbed down with pumice and oil.



WILLIAM AND MARY PERIOD CABINET
Photograph by the Metropolitan Museum of Art


TELEPHONE SET
HIGH SCHOOL GARDNER MASS.
PRACTICAL ARTS DEPT
DRAWN BY Dean Johnson
TRACED BY Robt. Starkey
DRAWING NO. 2.A.
SCALE 2"=1'-0" FEB. 11, 1927
Details of joints and construction
Scale 4"=1'-0"

TELEPHONE TABLE AND BENCH

Dean Johnson, High School, Gardner, Mass.

The telephone set described herewith makes a very acceptable problem for the elementary woodworking student. The table and stool may be made of any suitable wood. The material for the tops of the table and stool should be glued up. After all of the pieces have been cut to size, they should be carefully checked over for accuracy. Cold glue and dowels are used for the joints. Attention must be given to the proper clamping up when gluing together the side rails, end rails, and legs. If this is not done with great care, the frame will not be square. The tops are fastened to the rails with screws. For this purpose, ⅜-in. holes are bored half through the width of the rail. The hole is then finished with a ¼-in. bit for the screw.

When completely assembled, the stool should slide freely in the run of the table. Walnut or mahogany stain may be used on the wood. It should be allowed to dry for twelve hours. Then apply a coat of thin white shellac. Allow this to dry for one hour, after which the job may be lightly sanded with No. 00 sandpaper.

Small defects may now be filled with putty that has been properly colored to match the finish. Two coats of varnish are applied, each of them being allowed to dry for 72 hours. No. 00 sandpaper and linseed oil is used to sand down the varnish between coats. The final varnish coat should be rubbed down with powdered pumice and water, using a felt rubbing pad. This should then be followed with rottenstone and water, also applied with a felt pad. The whole is then polished with a dry cloth.

The related work which accompanies this shop problem, requires the students to figure out the cost of the material that has been used. Ten per cent for overhead is added to obtain the final cost of the material.

SMALL PLANER JACK

Dean Smith, Kern County Union High School, Bakersfield, Calif.

The small planer jack illustrated herewith will perhaps be of interest to instructors in machine shops. It is inexpensive, but involves a variety of lathe and benchwork, and when it is completed it has an actual value which helps to hold the interest of the student during and after the time required to make this useful article. Jacks of different lengths may be made following this general design, or extensions may be made which will fit the base of the jack adding to its capacity.

HAND TRAINING AND ITS VALUE

Reinhold Forkel, The School of Industrial Arts, Trenton, N. J.

It seems to me that our vocational training is overlooking something, when it neglects hand training. It is true, we are living in a machine age, and production is the watchword. It is too bad, however, when the schools adopt the same slogan, forgetting that the purpose of the schools is to educate the youth and to give him a sound training.

I am not blaming the schools entirely for this. There is at present a big demand for skilled labor due to the restrictions imposed by the emigration law. Our old craftsmen are fast disappearing and it is up to the schools to fill their places.

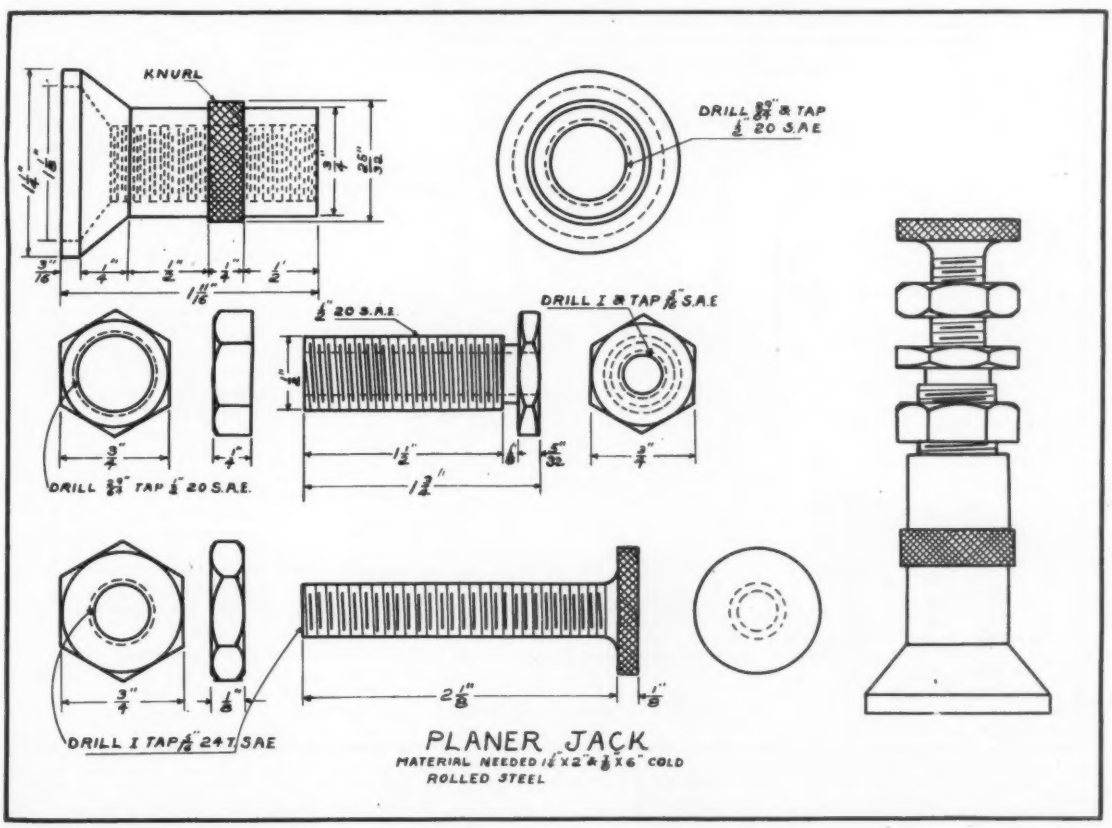
To solve this problem properly requires thorough consideration. The trouble, however, is that most of our schoolmen are not well acquainted with craftsmanship and good workmanship. They, therefore, adopt the slogan "Production," and fill the classroom with all kinds of modern machines. These machines are, of course, greatly favored by students who, for the most part, want to get away from manual labor as much as possible. The consequences are that the schools are turning out one-sided men—specialists.

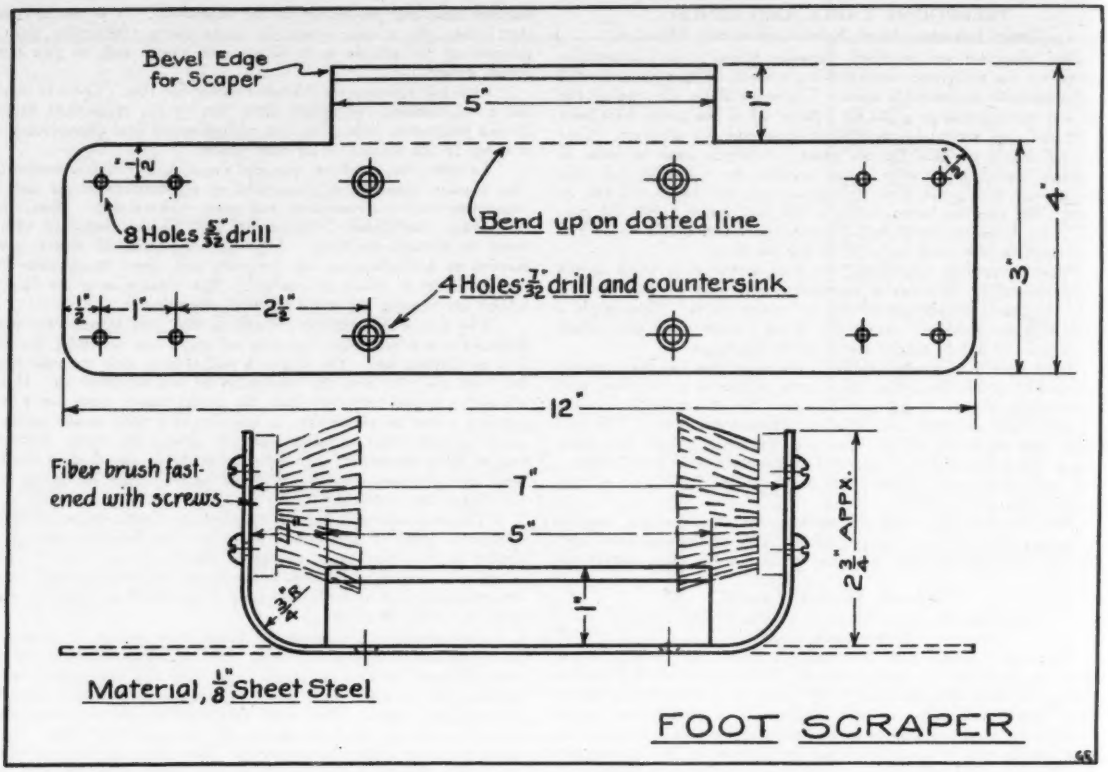
The future of students trained in this way is not very bright. Running a machine from morning till night and watching the clock, is a soul-killing job. The blame is not resting with the young man, but with the men and the institution he was intrusted to. If these schoolmen would only step into the young man's place for a while, running a saw or planer day in and day out, they would realize the grave mistake which is being made by giving the wrong instruction. Proper basic instruction in handwork would fit the student for more than mere machine tending. It would help to make the young man's life happy and contented.

The man who has had his eyes and his hands trained, will show a creative spirit in his work. He has a big field to work in and should he be called upon to run a machine, it will be a very easy matter for him to respond, as he knows all the fundamentals of good workmanship, and all he has to learn is to adjust the machine and to apply the rules of safety.

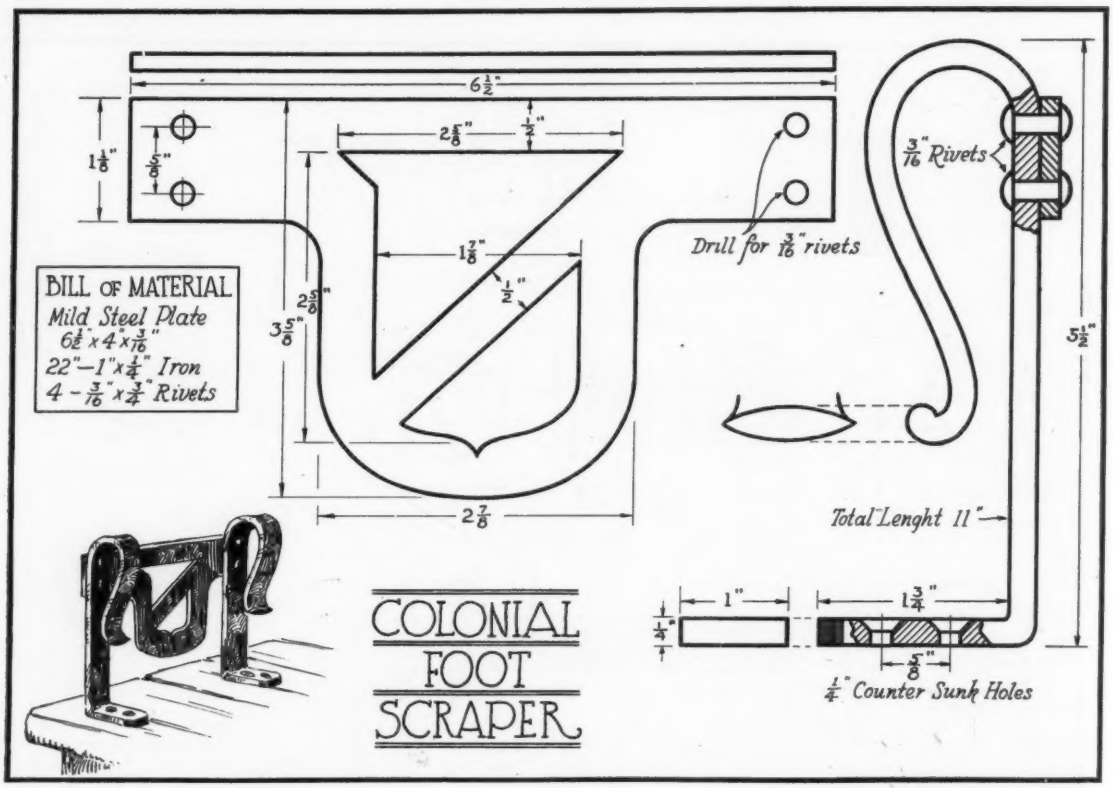
Our present age prevents our youth from getting in contact with the craftsmen, in shop and factory. During the last century, craftsmen were scattered around in small shops and the youngsters had the opportunity to visit these shops and gain considerable knowledge through these visits. They could ask questions and were even allowed to give a helping hand at times. By the age of 14 years, the boy could select his trade apprenticeship. The trade was not forced upon him. He chose it to satisfy the inner craving of his soul.

The work which he learned consisted of handwork. He was given the opportunity to practice, and through practice to acquire expertness under the guiding hand of the master who worked right with him.


KNURL
DRILL 29/64" & TAP 1/2" 20 S.A.E
1/2" 20 S.A.E
DRILL I & TAP 1/8" S.A.E
DRILL 29/64" TAP 1/2" 20 S.A.E.
DRILL I TAP 1/8" 24 T. S.A.E
PLANER JACK
MATERIAL NEEDED 1 1/4" X 2" & 1/2" X 6" COLD ROLLED STEEL



Designed by George G. Greene, Lane Technical High School, Chicago, Ill.



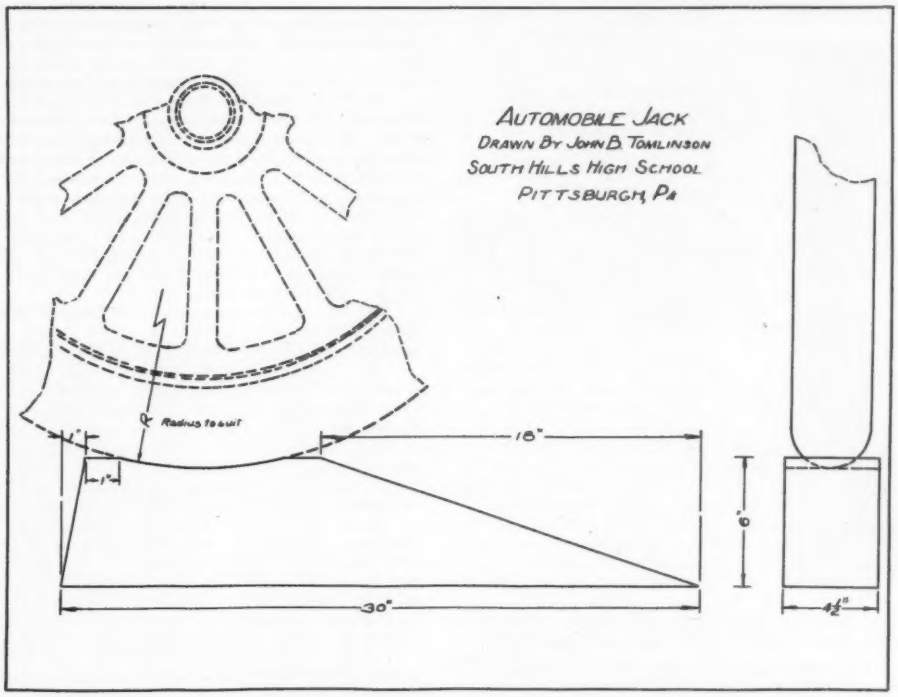
Designed by C. O. Greenleaf, Sarnia, Ont., Canada

Different is our present system of apprenticeship in some shops. The young man is put there to work and help, but whether he receives the proper training which he should receive and to which he is entitled, is another matter. Apprenticeship, therefore, suffers through lack of opportunities to practice.

Too often there are few guiding hands to look after the youth's interest, the older men usually being displeased to see the younger around, fearing the loss of their employment.

To sum up this situation, a great deal could be accomplished if our schoolmen would:

1. Meet the craftsman half way, remembering that the craftsman has just as much responsibility in promoting our national welfare as has the schoolman.
2. Treat the school as an institution of learning, not as a factory.
3. Hire teachers who are real craftsmen; artisans who are both artists and mechanics—men who can produce artistically and thus show their own individuality.
4. Not make beginning classes too large, and restrict the work in these classes largely to hand training. Along with this hand training should go free-hand and perspective drawing, mathematics, and English.



During the past thirteen years of teaching, and also during the sixteen years of my practical experience in various industrial lines, I have made a close study of the subject of hand training, and it is my conviction that our schools, especially vocational schools, must give more consideration to this basic subject.

AUTOMOBILE JACK

J. W. Heatley, South Hills High School, Pittsburgh, Pa.

The woodshop student who wishes to please dad with a very practical gift can do no better than to present him with a pair of auto jacks, which will permit him to safely work beneath his car. The car is raised to the proper height when it is driven up on this jack.

The exercise is made from one piece of stock 6 by 6 by 30 in., or it may be glued up from narrower lumber. Instruction may include directions for dressing up stock, laying out, use of trammel points, gluing, clamping, band sawing, and rules for developing safety-first habits.

INTERIOR DECORATION IN ITS PRACTICAL APPLICATION

A. T. Jonas, Grand Rapids, Michigan

Regardless of much that is being written and said to the contrary, there is today a greater desire than ever before, not only to build finer, but also more individual homes. Our environment, occupation, and everyday contacts help to develop our tastes as regards our home as surely as it does our mode of dress.

Interior decorating, so called, has reached far greater proportions in the last decade than was visioned by the majority of people. This has become possible because greater numbers are constantly discovering the possibilities that are within their reach of realizing the fulfillment of their concept of more beautiful surroundings. Gradually the erroneous idea is being broken down that the decorator is some sort of dictator who comes into your home and insists upon your changing and perhaps discarding most of your possessions. Any sincere decorator would much prefer to act in an advisory capacity before rather than as a critic after a certain type of decoration has been decided upon.

There is a logical reason for selecting every bit of material, and every color, as well as the final method of installing each window drapery and curtain. It is not a matter primarily to choose a given amount of material, but rather to decide which is the most suitable material for a specific need. If one lived in the country, or in the suburbs, or on a lake, and were fortunate enough to have a beautiful view, one would not want a curtain which would more than veil the windows. On the other hand, one would not care to live in an apartment, without sufficient covering for the windows to provide the proper amount of privacy. Then, too, there is the question of floor coverings, draperies, and accessories.

Color, today, seems to be the dominant note in all work of this line and there is nothing which so greatly adds to the beauty and genuine liveableness of a room as color intelligently used.

No one can say to you: Do your living room in green, your sunroom in orange, or your bedroom in orchid; but you may be able to use those colors provided your exposures are right for them and that you like to live with green, or orange, or orchid colors. If you have had a definite idea in mind as to the sort of room you want, you have, no doubt, accumulated something as a nucleus for that room. Some time ago, my assistance was asked in helping to select carpets and draperies for a living room in a home which had been built and occupied for some time. Not having seen the home, I asked the usual question "Is there some color already in the room which must be considered?" The answer was "No, we are starting at the beginning for this particular room." Several materials were shown and a partial decision was made as to draperies, pending a visit to the home to see the windows as to method of treatment, etc. Upon my arrival, the first thing which my eyes fell upon was a splendid painting over the fireplace with lovely blue-green and soft mulberry coloring. Upon further investigation and inquiry, a beautiful Rookwood vase was brought forth having the same shades. These two fine articles represented the individual taste of the owners and of the colors which they loved, yet they did not realize that they had settled their own color scheme if they wished to continue to use their most precious accessories.

This then, is all that is necessary—know your own preferences so clearly that everything you may select will help to build up your ideal room or home.

If you would like to learn more of just how simply and beautifully your own color sense and idea of proportion will unfold, go to any good library and get Frank Alvah Parson's book on "The

Principles of Interior Decoration" and once you have tried working out a little color scheme, the next one follows in true sequence.

By giving any specific window a little thought and analyzing its height, width, relation to the room's lighting, etc., you will soon have at least the fundamental idea as to whether you would use a valence to decrease its length or whether to use only side draperies to the floor to accentuate its height. When a window is narrow, we can make it appear wider by allowing the top draperies to extend over the casing on the wall and from thence to the floor. This effectually disguises the fact that it is so narrow. We are all more or less familiar with the color values of different shades, thus a gold or yellow shade will bring a glow like sunlight into a cheerless room, while a soft green will cool and soften a southern glare. If you have never given this subject much consideration, you have an unexplored world before you. It is wonderful to see the unfoldment of beauty which comes to you in the proper grouping of colors. Learn to use wisely three or four colors in the same room, always keeping in mind a sufficient amount of plain and neutral background, your two main colors contrasting, and the other added in smaller quantities for high lights.

Do not mistrust your own taste too much—it will improve with use; and feel free to go to your nearest decorator for advise in even the smallest detail. It will be gladly given and both the giver and receiver will be benefited.

A VACUUM ERASER CLEANER

This portable vacuum eraser cleaner was built by the pupils of the machine-shop class at the Lane Technical High School. Machine-shop instructors who are interested in getting castings or information for this project should write to Carl A. Carlson, Lane Technical High School, 1225 Sedgwick Street, Chicago, Ill.

VOCATIONAL AND INDUSTRIAL-ARTS ROUND TABLE AT THE UNIVERSITY OF PITTSBURGH

The annual vocational and industrial-arts meeting arranged by the vocational department of the University of Pittsburgh and the Carnegie Institute of Technology, was held on Friday and Saturday, July 27 and 28, at Pittsburgh, Pa. Mr. G. D. Whitney, head of the industrial-education department at the University, presided.

The meeting was opened with a talk by Mr. Loren H. Turner, director of vocational-education work at the Ralston School, Pittsburgh, who described the part-time cooperative plan as it has been worked out in his school. Mr. Henry Klonower, director of the teachers' bureau of the state education department, who followed, described the method of teacher certification for vocational and industrial-arts teachers. Mr. Klonower emphasized that teachers should grow through service and experience in the work, and he outlined some of the problems which confront the bureau when it is occasionally asked to certify a tradesman with little or no academic training.

Special problems of industrial-arts education proved to be of special interest at the meeting. Some of these problems were presented by students of the Pittsburgh summer session. Mr. F. H. Rohmer, of the vocational department at Lewistown, Pa., Mr. Frank Faxlanger of the Jamestown schools, and Lena Mann, director of special classes in the Donora schools, also gave talks. Mr. G. U. Cleeton of the Carnegie Institute of Technology gave a summary of the day's conference.

On Saturday morning, Mr. W. A. DeVette, instructor in mechanical drawing at Erie, Pa., gave a talk on "The Vocational Teacher and his Blackboard." Prof. W. F. Rasche of the University of Pittsburgh, outlined the trends of curriculum construction and described the study he is making of the one-unit plan of machine-shop work. Mr. Frank M. Leavitt, associate superintendent of schools at Pittsburgh, Pa., gave a summary of the second day's sessions. As one of the pioneers in vocational and industrial education, Mr. Leavitt gave a brief summary of the history of the movement, describing the meeting of the manual-training association held in Pittsburgh nineteen years ago. Mr. Leavitt commended those who pursue summer courses at the University and emphasized the need of encouragement in meeting the teacher's problem.—*G. C. Donson.*

THE VOCATIONAL EDUCATION SESSION AT THE OSWEGO SUMMER SCHOOL

A special conference of directors and supervisors of vocational education was held during a two-week period from July 16 to 28 inclusive, at the State Normal School, Oswego, N. Y. The program of the conference, which was divided into three parts, offered a thirty-hour course, three hours a day for ten days, on problems relating to the professional improvement of teachers. The program was made up of a series of lectures by prominent educators and teachers of vocational education, and round-table discussions of the topics presented.

The conference was opened by Dr. George M. Wiley, assistant commissioner of secondary education for New York state, who talked on the subject, "Adolescent Youth." Dr. Wiley emphasized that in the training of youth, it is necessary to build on the experience of the past, but always facing toward the future. He contended that youth is just as clean and straight in its thinking, in its devotion to ideals as the rest of us, and contended that youth as a group should not be charged with the shortcomings of individuals. He pointed out that, in education, we are too little concerned with youth itself, and that very little attention is being given to the solution of the problems of youth. In order to best serve the youth of the land, it is necessary to select types of service best adapted to their needs.

Dr. David Snedden, professor of education at teachers college, Columbia University, at the second session, discussed the topic, "The Social and Economic Needs of Vocational Education." Dr. Snedden contended that the fundamental policies of American life are beginning to effect vocational education, pointing out that the American people are steadily growing more wealthy and their wealth better distributed. The people of the country are living longer and their productivity has become more extended. Commodities are being produced by machinery. He contended that all these facts point to the conclusion that the general education of all the people will move upward and that there will be a greater conservation of life.

Dr. W. A. O'Leary, assistant commissioner of education in New Jersey, described the manner in which the county vocational school is organized and administered in New Jersey.

Dr. Robert L. Cooley, director of the Milwaukee Vocational School at Milwaukee, Wis., at the third session, took for his topic, "Part-Time Education." Dr. Cooley, in presenting his subject, contended that the young people of the country are the raw material out of which business will be later secured, and pointed out that a well-educated citizenship is the business man's best market. Business must have a citizenship with power to discriminate wisely, and with power to purchase the many products of American manufacturers.

Dr. J. C. Wright, director of the Federal Board for Vocational Education, in addressing the conference, talked on "Trends in Industrial Education," pointing out that it is the duty of educators to see that the school takes up the responsibility of preparing the boys and girls for entering industry, and to check the training given to determine whether or not it is functioning properly. Dr. Wright argued against the tendency to standardize in the field of education.

At the meeting on July 24, Dr. L. A. Wilson, assistant commissioner of vocational and extension education, spoke on the subject, "Apprentice Training." Dr. Wilson pointed out that industries change rapidly and that industrial changes have brought about changes in apprenticeship so that the apprentice of today no longer learns his trade under a master, but in a plant school under factory conditions. In some cases, both the union and the employer cooperate with the public schools in giving this training. In other cases, the union works with the public school, while in still other cases, the employer and the union jointly conduct a school for apprentices in the trade.

Mrs. Anna Burdick, agent for industrial education of girls and women, for the Federal Board for Vocational Education, talked on "Developments in Industrial Education for Girls and Women." Mrs. Burdick emphasized the large part played by women and girls in industry, and pointed to the increasing number of country boys and girls who are crowding into the cities. She pointed out that these young people are untrained and that here is where the day vocational and trade schools can render a good service. These young people must receive the proper training in order to be of the most value to themselves, to their employers, and to society.

Miss Florence Marshall, principal of the Manhattan Trade School for Girls, New York City, the last speaker, described the work of the Manhattan Trade School, tracing its history from a private institution to a public school, and commenting on the progress made in this field of education. Miss Marshall stressed the importance of trade training, placement, and follow-up work as conducted in the school, and described the manner in which articles made by the pupils are disposed of commercially. She pointed out that the need for day trade schools is growing to such an extent that the school is unable to take all applicants. The purpose of the school is to provide trade training, as well

as character building among the girls, teaching them to have a discriminating sense in choosing the highest in life.

Dr. Charles A. Prosser, director of Dunwoody Institute, Minneapolis, Minn., was the speaker at the banquet held on Saturday evening, speaking upon the topic, "The Stone Which the Builder Rejected." Dr. Prosser, in his talk, urged that vocational teachers discourage the contention that the teaching of the vocational subjects is less important than the teaching of academic lines. He held that the vocational teachers are accomplishing as much as academic teachers in the training of youth. Dr. Prosser urged that boys and girls be taught to meet the problems they will face in the work-a-day world. In this way, they will learn to think by doing, and will be fitted to perform the work of the world.—*J. C. Park.*

FIRST NATIONAL CONFERENCE OF DECORATING INSTRUCTORS

Coincident with the annual convention of the American Vocational Association to be held December 13 to 15 of this year at Philadelphia, the instructors in the relatively new vocational field of wall-paper hanging and interior decorating will meet in conference. The details of the program are not complete as yet, but will doubtless include discussion meetings at which the problems of organizing classes and instruction in this field will be presented and discussed; visits to actual classes in operation in Philadelphia; a dinner and social meeting at which there will be opportunity for making the acquaintnceship of men conducting similar classes in all parts of the country and informal exchange of experiences.

A strong program committee, national in scope, is planning an extremely interesting and valuable conference at Philadelphia. Instructors in the decorating trades are given this brief advance notice in order that they may begin immediately to plan to attend. Further details regarding this conference will be published from time to time as the program plans develop.

HEAD OF THE DEPARTMENT OF INDUSTRIAL EDUCATION

Mr. Cleeton, who was formerly associate professor of education and psychology at the Carnegie Institute of Technology, Pittsburgh, Pa., has recently been appointed head of the department of industrial education of the same institution.

MR. GLEN U. CLEETON
Head of Industrial Education Department,
Carnegie Institute of Technology,
Pittsburgh, Pa.

Mr. Cleeton holds a B.S. degree given by the Missouri State Teachers' College, and a M.A. degree given by the University of Iowa. He is at present completing graduate work leading to the degree of Ph.D., at the University of Iowa. He is the author of "Tests of General Mental Ability," and joint author of a series of trade tests now in preparation for use in schools and colleges in Pennsylvania. He is a frequent contributor to the professional literature of the day.

NEW BOOKS

Descriptive Geometry

By William H. Kirchner and Henry C. T. Eggers. Cloth, 184 pages, illustrated. Price, $2.25. McGraw-Hill Book Co., New York City.

This book has been developed especially for engineering classes, which require in a semester, or quarter's work, a fairly limited but thorough introductory course.

Elements of Machine Design

James D. Hoffman and Lynn A. Scipio. Cloth, 328 pages, illustrated. Ginn & Company, Boston.

This book is addressed to advanced students of engineering and to practical designers. It assumes a fair foundation of mathematics and mechanics in both the first part which lays down the fundamental principles of machine design, and in the second part which suggests a series of practical applications of the information given in part one. The method of presentation of the problems in part two, tends to simplify the technical analysis of problems and to cause the student to seek both the best and the most economical solution of problems. Both attitudes are valuable for practical work.

Mechanical Drawing Test

By D. W. Castle. Test and manual, 25 cents per set. Manual Arts Press, Peoria, Ill.

This test has been developed to determine the information and skill of students in five divisions: (1) interpretation of drawings, (2) use of arithmetic (dimensions), (3) use of geometry, (4) pencil technic, and (5) pen technic. The manual explains the psychological problems involved in the different parts of the test and provides full directions for giving and scoring the test. The test has been given preliminary tryouts. It deserves to be fully tried to determine its validity and reliability, and to establish norms by which teachers can judge the work of their classes.

Shop Tests; Series 2

By Wm. L. Hunter. Price, 25 cents per set. Manual Arts Press, Peoria, Ill.

Fourteen tests in school shopwork are here presented. The author has made excellent use of the best and newest ideas in its construction, and the subject matter tested is basic, but he has not stopped to standardize the series.

Essentials of Applied Electricity

By E. W. Jones. Cloth, 254 pages, 5⅛ by 7¾, illustrated. Price, $1.36. Published by The Bruce Publishing Company, Milwaukee, Wis.

This book will be found satisfyingly complete for an elementary book. The author not only explains the subject matter very thoroughly, but also outlines a very interesting set of practical projects in electricity which the student can make.

The teacher will find a number of very useful hints which will assist him in equipping his shop in a more practical manner, and to make his teaching more efficient.

Examples of Lettering and Design

By J. Littlejohns. Boards, octavo, 64 pages. Price, $1.25. Published by Issac Pitman & Sons, New York City.

Recent books of lettering have tended to elaborate presentation of the subject matter, with numerous plates and exact directions for lettering construction.

The present book is a return to the simplest possible explanation of the basic Roman black letter and italic alphabets, which are illustrated with carefully drawn plates. A few applications of the alphabets to simple commercial work and a few ornamental initials and monograms complete the book.

Junior High School Printing

By R. Randolph Karch. Loose-leaf form in binder. 175 pages, 5½ by 8½, illustrated. Price, $1.48. Published by the Manual Arts Press, Peoria, Ill.

The author has succeeded in producing an exceedingly usable combination of textbook, unit instruction sheets, and notebook. Each unit consists of an explanation, statement of problem, and a series of questions. Ample space is provided for the student's answers, and where necessary, separate proof sheets are inserted. The course is well organized, and covers the elementary phases of printing in a very able manner.

A Practical Course in Roof Framing

By Richard M. Van Gaasbeek. Cloth, 264 pages, 4¾ by 7¼, illustrated. Published by Frederick J. Drake & Company, Chicago, Illinois.

This text explains in a very thorough manner, just how to proceed with the laying out of a roof. The book is well illustrated. It also contains a chapter on the development of hopper bevels, and how to miter rake and level moldings.

Simplified Mechanical Drawing

By Thurman C. Crook. Cloth, 154 pages, 6¾ by 8⅞, illustrated. Price, $1.25. Published by McGraw-Hill Book Company, Inc., New York City.

This book is a textbook on mechanical drawing for grades seven, eight, and nine. The subject matter is divided into four units, under each of which are included quite a number of problems and questions.

The author's suggestion in the preface that inking should be delayed until the time when the student has learned to make a good clean pencil drawing, deserves to be followed by more teachers than are doing it now.

The drawing plates in the book are very well done, although the problems themselves are quite of the everyday conventional type.

NOW, ARE THERE ANY QUESTIONS?

Manual Training for Elementary and High Schools

822. Q.: During the coming college term I am to prepare a 30,000-word thesis as part requirement for the degree of master of commercial science. My subject will be in the nature of "A Course in Manual Training for Elementary and High Schools."

Can you give me any advice as to the planning of this work?—*W. E. B.*

A.: *Books:* (1) Content and Methods of the Industrial Arts. Vaughn and Mays. Price $2. Published by The Century Book Co., New York City. (2) The Manual Arts. Charles A. Bennett. Price $1.50. Published by The Manual Arts Press, Peoria, Ill. (3) Teaching Shop Work. M. W. Haynes. Published by Ginn and Company, Chicago. (4) Teaching Manual and Industrial Arts. McMurry, Eggers, and McMurry. Price $2. Published by The Macmillan Company, New York City.

Pamphlets: (1) Course of Study in Manual Training. Frank H. Shepherd. Published by Oregon Agric. College, Corvallis, Oreg. (2) Report of Division of Industrial Arts. 1925. Chas. F. Bauder and Edwin C. Broome. Published by The Board of Public Education, Philadelphia, Pa. (3) Report of Division of Industrial Arts. 1926. Chas. F. Bauder and Edwin C. Broome. Published by The Board of Public Education, Philadelphia, Pa. (4) Manual Arts Education in the Grades and Junior High School. 1927. W. W. Scott. Published by Manual Arts Department, Topeka Public Schools, Topeka, Kans. (5) Industrial Arts Education in Grades 7-8-9. Bulletin No. 4. Published by Department of Public Instruction, Harrisburg, Pa.

All of the following have appeared in the *Industrial-Arts Magazine:*

Articles: "Factual Bases for Curriculum Building in Junior High School Industrial Arts," A. H. Edgerton. March, 1925; "The Teacher's Plan," R. W. Selvidge, March, 1927; "Some Teaching Rudiments Recalled," Jos. J. Lukowitz, Sept., 1927; "Organization of Lessons," Sylvan A. Yager, Sept., 1927; "Proposed Reconstruction of Industrial-Arts Courses in Secondary Schools," April, 1928; "Inspection Trips Through Industrial Establishments," Herbert C. Ruckmick, July, 1928.

Bows and Arrows

823. Q.: Are there any authoritative books or articles available on making bows and arrows?—*E. W.*

A.: Full information on the making of bows and arrows may be found in the July, 1926, issue of *Popular Science Monthly,* on page 69.

You may also find useful and helpful material in the following books and magazines:

Pope's Adventurous Bowman, $4.50, G. P. Putnam, New York City; Elmer's Archery, $5, Penn Publishing Co., Philadelphia, Pa.; Pope's Study of Bows and Arrows, $1.75, University of California, Berkeley; Pope's Yahi Archery, 75 cents, University of California, Berkeley; Revival of Archery, *Popular Mechanics,* July, 1925; Archery —The Latest Summer Sport, *Popular Science Monthly,* July, 1926.

Airplane Building

824. Q.: I am requested to introduce a course on airplane building. Could you advise me as to where I could be able to get designs, blue prints, and the like?—*E. B.*

A.: *Articles:* (1) Toy Airplane, May, 1926, *Industrial-Arts Magazine.* (2) First Annual Model Airplane Tournament, June, 1928, *Industrial-Arts Magazine.* (3) How to Make a Flving Model, Oct., 1927, *Popular Science Monthly.* (4) A Seaplane Model That Flies, June, 1928, *Popular Science Monthly.* (5) Airplane Model for Racing, May, 1928, *Popular Science Monthly.* (6) Step-by-Step Instructions for Building a Remarkable Low-Wing Monoplane That Flies 700 Feet at High Speed, Aug., 1928, *Popular Science Monthlv.*

Books: "Building and Flying Model Aircraft," by Paul E. Garber. 198 illustrations, 300 pages, cloth $2.25. Published by The Ronald Press Company, 15 East 26th St., New York City.

"Elements of Aviation," by V. E. Clark, illustrated, 193 pages, cloth $3.00. Published by The Ronald Press Company, 15 East 26th St., New York City.

"How to Make and Fly a Model Aeroplane," Project pamphlet, price 25 cents. Published by Practical Arts Publishing Co., 44 Vista Ave., Elizabeth, N. J.

"How to Build and Fly Model Airplanes," 64-page pamphlet, price 5 cents. Published by Ideal Aeroplane & Supply Co., Inc. 24-28 West 19th St., New York City.

The Mount Carmel Mfg. Company, Dept. H, Mount Carmel, Conn., puts out the "Mocar" Monoplane, parts of which are to be assembled by students. Price $1.

Marbleizing, Stippling, Mottling, and Frescoing

825. Q.: Kindly let me know the kind of material that is used and how it is applied for the following finishes: Marbleizing, stippling, mottling, and frescoing.—*G. R.*

A.: *Marbleizing:* Marbleizing is the imitation of marble with paints and varnishes. Thus, for imitating white marbles, use a ground color of white lead. While this ground color is still wet, the veining is done with drop black and slate color, which must be blended down. For imitating red granite, use a salmon tint, and black, red, and white for the marbleizing. The marbling may be put on in dots and splashes with a brush or it may be spattered on with a stiff brush, or it may be put on by stippling with a coarse sponge. After the colors used for marbling are dry, the entire surface is protected by one or more coats of varnish.

Stippling: Stippling is done to obliterate brush marks in painting and to give an appearance of uniformity. The paint must be of such a consistency that it shows no tendency to run. After it has been applied and while it is still wet, the entire painted surface is gone over with a stippling brush. The method of using this brush is to strike the painted surface with the ends of the bristles, the bristles themselves being held at right angles to the painted surface.

Mottling: Mottling is done by applying a ground coat which is allowed to dry. A small portion of the surface is then covered with the desired mottling color and before this has set, the surface is gone over with balls of paper, leather, or cloth, loosely held in the hand and used very much as a stippling brush is used. The application of the paper, leather, or cloth in this way removes some of the mottling color that has been applied, allowing the undercoat to show through and giving the surface a mottled appearance; hence the name "mottling."

Frescoing: Frescoing is the name applied to the decoration of painted surfaces such as is used in churches, theaters, and the like. Stencils are usually used in this type of ornamentation.

A Fire Extinguisher

826. Q.: Can you furnish me with a formula for an inexpensive fire-extinguishing compound?—*E. A.*

A.: A very inexpensive mixture that can be used for smothering a fire can be made by mixing one pound of carbonate of soda with a peck of sawdust. This material can be mixed in large quantities and when used as an extinguisher, is thrown on the fire with a shovel.

Furniture Polish

827. Q.: I am anxious to get a formula which I can use to prepare a cleaner and polisher for desk tops.—*R. F.*

A.: An economical cleaner and polisher can be made by mixing together equal quantities of cider vinegar, sweet oil, and turpentine. The vinegar cuts the dirt, the oil gives the gloss, and the turpentine expedites the drying.

PERSONAL NEWS NOTES

Mr. W. B. Perkins of Marlin, Tex., has been elected instructor in manual training in the high school at Cleburne.

Mr. J. H. Lefforge of Goshen, Ind., has become assistant professor of agronomy at the agricultural school.

Mr. James A. Auld of Moundsville, W. Va., has been elected manual-training instructor at the Union High School, Wheeling.

Mr. W. S. Jeffries of State College, Pa., has been appointed supervisor of vocational training in the schools of Center county. Mr. Jeffries' work as director will coordinate with that of Glenn Rogers, county superintendent, and R. C. Blaney, county farm agent.

Mr. W. N. Merriman of Wauconda, Ill., has been elected as instructor of advanced manual training at Indianola, Iowa.

Mr. Frank Bull has been appointed as supervisor of vocational work in the high schools of western Tennessee.

Miss Emma Kline of Huntington, has been elected president of the Indiana Vocational Home-Economics Teachers' Association. Miss Nell Jones was elected vice-president, and Miss Catherine Weaver secretary.

Mr. Ernest Kling of Woodhull, Ill., has become instructor in manual training at Beaucamp, Tex.

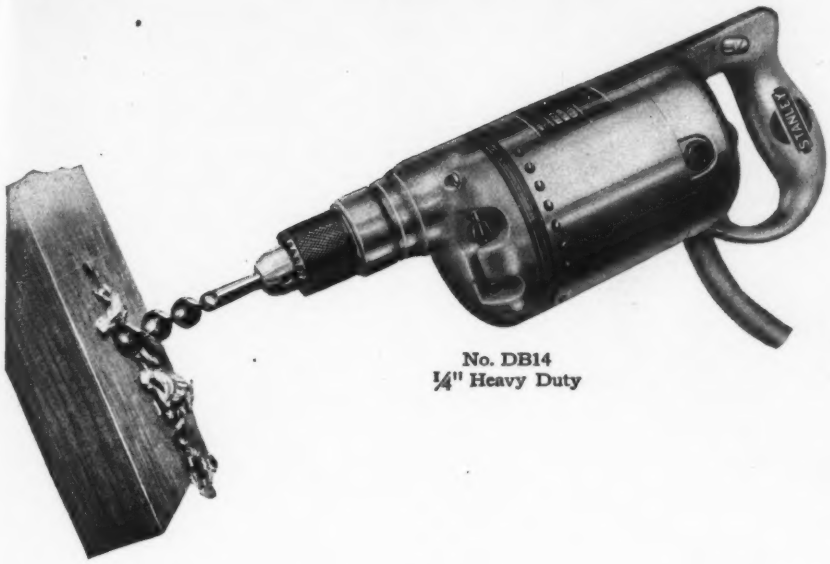
Mr. F. J. Finkbeiner of Wausau, Wis., will succeed H. F. Menzel of the Appleton Vocational School as district representative of the state industrial commission. Mr. Finkbeiner will be located at Green Bay.

Mr. Elzie Rutledge of Good Hope, Ill., has been appointed as instructor in manual training at Bushnell, Ill.

Mr. Carl Lindeman, formerly director of mechanic arts at the North Dakota State Normal and Industrial College, Ellendale, N. Dak., has become industrial-arts teacher trainer at the Western State Teachers' College at Kalamazoo, Mich. Mr. William Heckmann, formerly an assistant in the mechanic-arts department, has been appointed as director to succeed Mr. Lindeman.

Mr. Selmar Wally has been elected as instructor in manual arts at Miller, S. Dak.

(Continued on page 26a)



No. DB14
¼" Heavy Duty

Stanley now offers these new auger bits for Electric Drills. They are especially designed for use with chucks as small as ¼" capacity and are particularly adapted to the high speed of these tools.

Stanley Electric Drills set new standards of performance

This drill and its companions have already established a new and higher standard for electric drill performance.

This is the verdict of manufacturers, mechanics and carpenters who have used the Stanley drills on the hardest jobs.

A Stanley Electric Drill equipped with our Bench or Wall Stand and attachments will make excellent equipment for the Woodworking, Machine, Automotive, or Metal Shop.

Try out one of these drills and attachments in your shop and convince yourself of their performance. Your dealer will be glad to supply you with them.

The coupon below will bring you a copy of our catalog No. S59 which describes the full line of Stanley Electric Tools.

No. DB14, ¼" Heavy Duty Electric Drill in No. 532 Bench Drill Stand.

STANLEY TOOLS

STANLEY TOOLS

The Stanley Rule & Level Plant,
Educ. Dept., New Britain, Conn.
Please send me Catalog No. S59 which describes Stanley Electric Tools.

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Valuable Tables

In addition to fulfilling its primary job as the leading textbook on twist drills and drilling practice, the "Handbook for Drillers" contains several valuable tables of Cutting Feeds and Speeds. These tables are in constant daily use in hundreds of the largest machine shops in America.

Copies of the "Handbook," in any reasonable quantities, will be furnished free to supervisors and instructors of industrial and vocational education for use as textbooks by students in machine shop practice.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON SAN FRANCISCO
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

(Continued from page 380)

Mr. Fred Jeske has been elected as instructor in manual arts at McIntosh, S. Dak.

Mr. L. N. Jewett has been elected as vocational-agriculture instructor at the Parsons High School, Parsons, Kans.

Miss Maud Price has been appointed to teach dressmaking and decorative arts in the vocational school at Tullahoma, Tenn.

Mr. George K. Wells has recently been appointed as state director of vocational education in Indiana, succeeding Mr. Denman Kelley. Mr. Wells was formerly vocational teacher trainer at the Indiana State Normal School, Terre Haute. He holds a B.S. degree given by the Emporia Normal School, and a M.A. degree given by the University of Chicago.

Mr. J. H. Hendrickson, formerly principal of the Freelandville school, Knox county, has become assistant director of rehabilitation in Indiana, to succeed C. B. Gwyn.

Mr. F. T. Mitchell has been added to the staff of the vocational agricultural division of the Arkansas Department of Education. Mr. Mitchell will act as a supervisor of Smith-Hughes work in the high schools of the state.

Mr. Albert J. Jameson and **Miss Elizabeth Burbank** have been reelected as members of the board of trustees of the Fanning Trade School for Girls at Worcester, Mass.

Miss Esther Wolla of Athens, Ga., has been appointed to teach home economics in the vocational school at Green Bay, Wis. Miss Wolla succeeds Miss Gertrude Meiselwitz, who goes to the Maryville College in Tennessee.

Dr. Riley J. Clinton has been appointed associate professor of education, and **Dr. Herbert R. Gaslett,** associate professor of psychology at the Oregon Agricultural College, Corvallis, Oreg.

Mr. Charles Beardsley of Eau Claire, Wis., has been appointed assistant supervisor of rehabilitation on the Wisconsin board of vocational education. Mr. Beardsley succeeds Joseph H. Brown.

Mr. Sam Stout has been appointed as vocational counselor for the nine commissioned high schools of Henry county, Ind. In his new work, Mr. Stout will visit each school in the county four times during the year, meeting with the classes and giving lectures or conducting sessions.

PUBLICATIONS RECEIVED

The Foreman and Labor Turnover. Paper, 15 pages. Series No. 3, issued by the service bureau of the Metropolitan Life Insurance Co., New York. The pamphlet contains a composite of the views of forty manufacturing concerns on the position of the foreman. The manufacturers brought to the study their own ideas of accomplishment, the best means of bringing about these accomplishments, and his methods for maintaining interest among employee groups. Incentives are also given for the control of labor turnover in the several departments.

The Art of Making Leather for Books

By Frederick N. Moore, 95 South Street, Boston, Mass. A valuable pamphlet describing the origin, tanning, coloring, and use of leathers for book production.

Dictionary of Leather Terminology

Published by Members of the Joint Committee of Tanners and Leather Goods Industries, Room 1510, 41 Park Row, New York, N. Y.

This pamphlet will be found valuable in classes where shoe repairing, bookbinding, furniture upholstering, etc., are taught.

—"The Story of Iron" is the title of a new motion picture just issued by the Bureau of Mines, of the U. S. Department of Commerce. The film shows in an interesting manner, the processes involved in the mining of iron, some views of early iron industry, the methods used in prospecting for ore deposits, and the location and extent of the Lake Superior ranges, the Birmingham district, and other areas from which the bulk of American iron ore is obtained. Copies of the film are available for schools upon the payment of the small cost of transportation. Further information may be obtained by writing to the Pittsburgh Experiment Station, graphic section, U. S. Bureau of Mines, Pittsburgh, Pa.

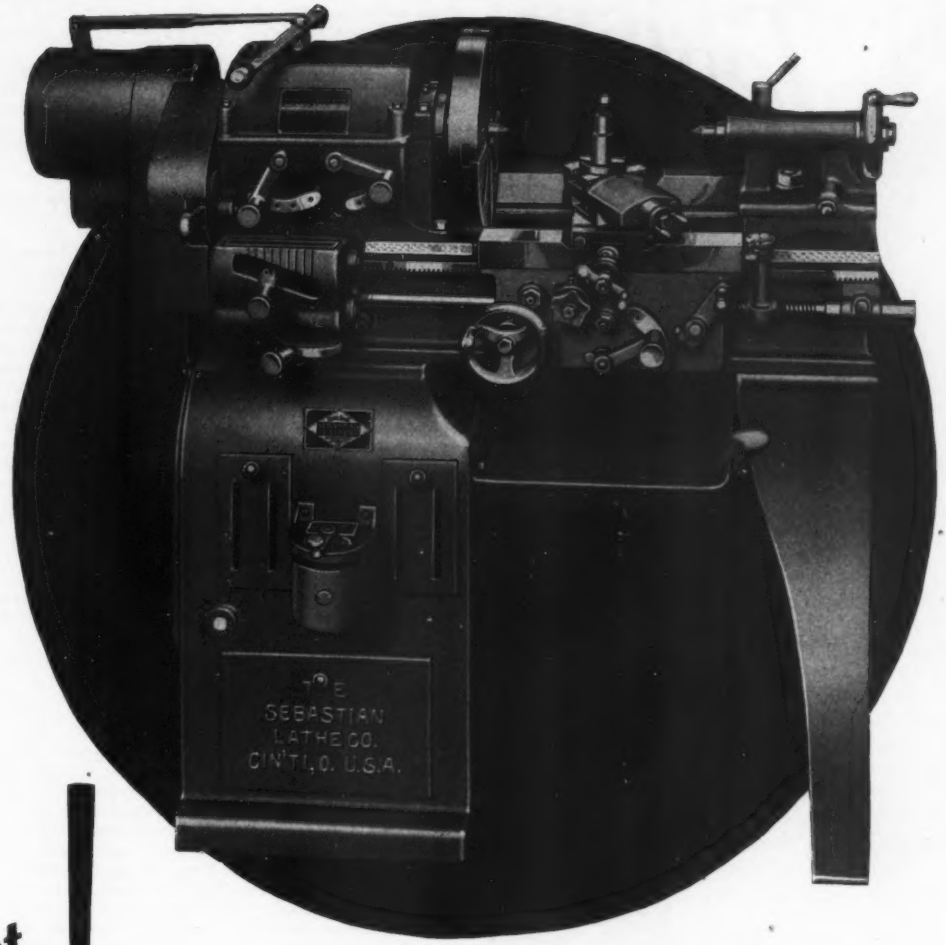
American System of Weights and Measures. American Institute of Weights and Measures, 115 Broadway, New York, N. Y. This 64-page pamphlet has been written with the aim of opposing any change in the American system of weights and measures. It is brought out that the present system has an intimate relation to the business and daily life of the country and that it may not be changed over to the metric system without radical departure from present customs and a huge waste in materials and products.

BULLETIN ON STEEL LOCKERS

The Lyon Metal Products, Inc., has just issued a new bulletin on steel lockers containing specifications of sizes, standardized nomenclature, and standardized installation details. The bulletin is of especial importance to school authorities and architects engaged in the specification and installation of steel lockers.

(Continued on page 28a)

The Lathe Without an Alibi



Get these 7 Points

1. It is a small lathe with large lathe capacity.
2. It is oversized at every point.
3. It is absolutely safe.
4. It is practically unbreakable.
5. It is "sized" down to the student.
6. It is compact and not more "lathe" than you need.
7. It is the type lathe your Student will operate when he finishes School and gets into Industry.

Gold Seal
SEBASTIAN
LATHES
GUARANTEED
CORRECT

Use this Coupon

The Sebastian Lathe Co.,
Cincinnati, Ohio.

Send descriptive Bulletin of your New 11-inch Lathe.

Name .....

Position .....

St. & No. .....

City ..... State .....

IAM-10

Every Blade *Tested*

". . . a long row of experts, who test 'Yankee' screw-driver blades—each and every one of the hundred of thousands."

WHEN is a test, a *test?* In some industries, tests of products are made on an average of one out of every so many: one tested in a thousand, one in a gross, one in a dozen—as the rule may be.

The "Yankee" Screw-driver you buy from your hardware dealer has a tested blade. The *very* one you get!

Every "Yankee" blade is tested by "Yankee" toolmakers. Individually tested—and *twice* tested!

The blade won't twist, crack, break, or bend on the edge; and it can't be loosened in the handle by use or even abuse.

"YANKEE" Plain Screw-drivers can be depended on. Well balanced, and with "Yankee" comfort-grip handles, they make work easier.

No. 90.—Standard Style: Fifteen sizes, 1½" to 30" blades. Price for 5" blade, 50c; 6", 55c; 7", 65c; 8", 75c.

No. 95.—Cabinet Style: Eleven sizes, 2½" to 15½" blades. 4½" blade, 40c; 5½", 45c; 6½", 50c; 7½", 60c.

"YANKEE" *on the tool you buy means utmost in quality, efficiency and durability.*

"Yankee' Tool Book Free to mechanics, motorists and handymen

Shows "Yankee" Tools in use: Ratchet, Breast, Hand, and Chain Drills. Automatic Bench Drills. Ratchet Tap Wrenches. Automatic Push Drills. Spiral and Ratchet Screw-drivers. Removable-base Vises, etc.

North Bros. Mfg. Co., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

(Continued from page 26a)

A BOOK ON SPRAY PAINTING

The Hartford Accident and Indemnity Company of Hartford, Conn., has issued a booklet entitled "Spray Painting; Its Hazards and Safeguards," which describes the spray method of painting, tells some of the health hazards, and shows how the worker may be safeguarded through effective ventilation, metering the air, and prevention of dust accumulations.

The booklet points out that in spray painting, special attention should be given to the location of the equipment, the capacity of the equipment, the power for driving equipment, and the design for booths and ducts. All of these matters enter into the general installation of proper equipment and affect the relationship of construction and maintenance cost to the efficiency of the system.

HOW PRINTING IS USED TO MEET DEFINITE SELLING PROBLEMS

The S. D. Warren Company of Boston, Mass., has issued a booklet of 98 pages showing how printed pieces may be used to meet definite selling problems.

With the direct help of applied advertising, the Warren Company presents the use of booklets and pamphlets used in the merchandising of products and shows the part that printing plays in each.

The booklets tell prospective buyers what they want to know, illustrate a plan for complete circularizing, follow-ups, and layouts for production service, and show interesting examples of house organs, production bulletins, and mailing campaigns for prospects. In addition, there are typical booklets showing courses in salesmanship, talks to prospects, and booklets and advertising literature for sales and advertising campaigns.

The Warren Company makes important use of the booklet "Printing Paper" and shows how the advertising and selling campaign makes possible standard printing papers and also makes it easier for the printer to sell good printing on Warren's standard papers.

The booklet illustrates completely and satisfactorily the part that the editorial sections of magazines and business papers play in direct selling, and shows how printed pieces may be economically used to supplement oral selling.

Copies of the booklet may be obtained by addressing the school department of S. D. Warren Company, 101 Milk St., Boston, Mass.

NEWS AND NOTES

Announce Winners in Colored-Pencil Drawing Contest. The judges in the Eberhard Faber colored-pencil drawing contest recently awarded the prizes to the successful contestants. The first prize was an embossed-leather writing case, containing a complete set of Faber rainbow colored pencils, Van Dyke drawing pencils, and erasers; the second prize was a writing case of brown leather, containing the 24 colors of the Faber rainbow colored pencils and other drawing requisites; and the third prize was a writing case, containing an assortment of rainbow colored pencils, Van Dyke drawing pencils, and other useful drawing articles. The judges were unanimous in their praise of the general high quality of the drawings submitted, and the prize winners were selected only after careful study and consideration of the many fine points of art involved.

A Vocational-Arts Major for California High Schools. The new vocational-arts major for California high schools, approved by State Supt. W. J. Cooper, provides for thirty hours' credit in industrial courses to be counted toward the high-school diploma. As the purpose of the provision is to prepare the student definitely for a gainful occupation, the major must be in some one trade or industrial occupation.

Subject groups included are: Metal trades, auto mechanics, machine shop, building trades, printing, drafting, electricity, arts and crafts, commercial art, clothing and foods.

Teachers in vocational-arts major courses must have both trade experience and a special credential in the field taught. Practical training on the job is provided for the student, and trade instructors are urged to form trade contacts to help in the placement of learners and to follow up the students when employed.

Announce Civil Service Examination. The U. S. Civil Service Commission has announced an open competitive examination for economist and associate economist on October 10. The examinations are to fill vacancies in the forest service of the U. S. Department of Agriculture, for service in Washington, D. C., or in the field. The position of economist carries a salary of between $3,800 and $4,400 a year, and that of associate economist between $3,200 and $3,700.

Full infocmation may be obtained from the U. S. Civil Service Commission, Washington, D. C., or from the secretary of the civil service board of examiners at any post office in any city.

Summer Session at Kansas College Draws Large Attendance. Between 700 and 800 students answered the roll call at the opening of the August summer session at the Kansas State Teachers College, Pittsburg, Kans. The term covers a period of four weeks and the work offered is intensive due to the shortness of the term.

(Continued on page 31a)

(Continued from page 28a)

Conference on Printing Education Held at Los Angeles. The Conference on Printing Education for the Pacific Region was held July 5, 6, and 7 at the University of California at Los Angeles.

At the Thursday morning session, Mr. John C. Beswick, Chief, Bureau for Trade and Industrial Education, State Department of Education, Sacramento, acted as chairman and leader for the discussion. The topic was "The Trained Craftsman." Mr. Wm. H. Barry, Manager, Master Printers' Association, Los Angeles, was chairman of the afternoon conference, which had for its discussion, "The Need for Trained Craftsmen."

The Friday morning session was in charge of Mr. Wood Glover, President, Los Angeles Club of Printing House Craftsmen, who led in the discussion on "The Printing Apprentice." The afternoon session was in charge of Dr. Edwin A. Lee, Director, Division of Vocational Education, University of California, Berkeley, who discussed "The Teacher of Printing."

The closing session on Saturday was in charge of Mr. Nicholas Ricciardi, Chief, Division of City Secondary Schools, State Department of Education, Sacramento, who discussed the topic "The Public Schools and Printing."

St. Louis Schools Offer Evening Course for Sheet-Metal Workers. An evening class in drafting for sheet-metal workers has been conducted at the Central High School, St. Louis, Mo., since March, 1922. The initial effort was made possible through the enthusiasm and energy of Mr. Frank Higgins, Sr., who cooperated with the apprentice committee of the sheet-metal contractors' association. The joint committee has continued the evening work with the active support of the public schools.

During the past year, over one hundred registered apprentices and journeymen have been enrolled in different parts of the course, the attendance having required the services of three teachers.

Mr. Hebberger who has had charge of the work since its organization, is now instructor in drafting and sheet-metal work in the vocational school.

The course for apprentices covers four years, two evenings each week, and is arranged to permit pupils to enroll at any time during the school year, and to progress as rapidly as the ability, preparation, and experience of the pupil will allow. The course is as follows:

First Year: First Term—Drafting. Two evenings per week.

Introductory drawing and elementary pattern drafting including use of instruments, geometric construction, projection of working details, parallel line surfaces, development of geometric solids, of prismatic and cylindrical forms, with problems showing the application to patterns for trade objects.

Second Term—Drafting. One evening per week.

Pattern drafting continued: parallel line developments of patterns for angles, elbows, and offsets in pipe and duct work.

Mathematics. One evening per week.

Review of fundamental arithmetical operations. Areas of rectangles, parallelograms, trapezoids and circles. Solution of simple equations and the use of formulas. Areas and volumes of prisms, cylinders, pyramids, cones, and frustrums.

Second Year: First Term—Drafting. One evening per week.

Parallel line development of surfaces for intersecting prismatic and cylindrical forms as applied to patterns of T connections and simple Y branches in round, oval, and rectangular pipe.

Mathematics and Science. One evening per week.

Figuring material for sheet-metal work. Changing pipe shapes maintaining equivalent areas. Determining pipe sizes equivalent to the sum of a number of areas. Simple mechanics: levers, inclined planes, pulleys, and wheel and axel.

Second Term—Drafting. Two evenings per week.

Radical line development of surfaces for simple, cut, and intersected conic and pyramidic forms applied to trade patterns.

Third Year: First and Second Term—Drafting. One evening per week.

Triangulation of irregular surfaces applied to patterns for duct and pipe fittings, aprons, housing, and hoods.

Mathematics and Science. One evening per week.

Metallurgy: Occurrence, properties, alloys, and uses of iron and steel, nickle, tin, lead, zinc, and aluminum.

Mechanics: Center of gravity, work, horse power, and friction.

Heat Transmission and Measurement: Conductivity and insulation; expansion of metals due to heat.

Fourth Year: First and Second Term—Drafting. Two evenings per week.

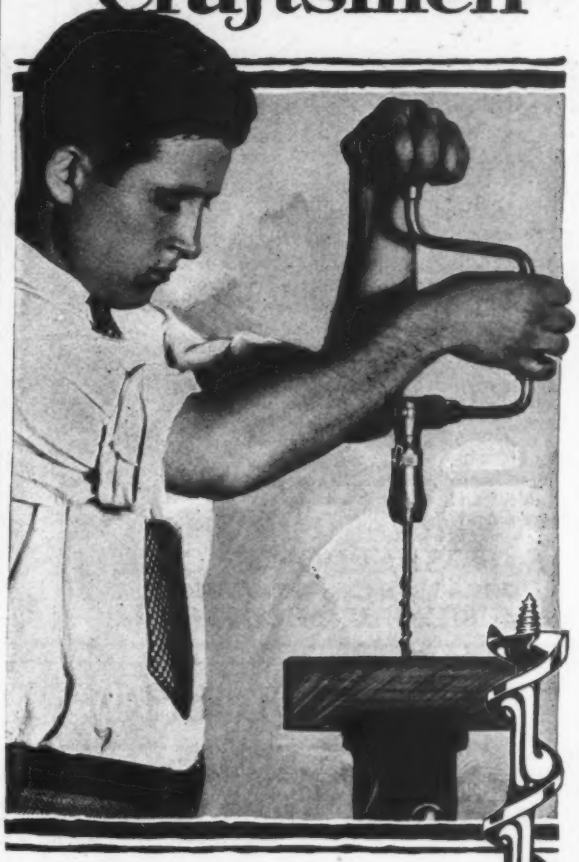
Surface development and design as applied to ornamental sheet-metal work; pattern drafting and design for skylights.

Vocational Department in High School. A vocational agricultural department will be established in the high school at Rutherfordton, N. C., this year. The school will draw students for this department from parts of the Oakland and Shiloh districts, Green Hill, Gilkey, Union Mills, Spindale, and Ruth.

Vocational School Proposed at Brockton. Plans are being discussed for the establishment of a vocational school at Brockton, Mass.

(Continued on page 36a)

Better Tools make Better Craftsmen



PRIDE in doing well-finished work does more towards holding the interest of your students than any other factor. Irwin Auger Bits, because of their clean, true cutting ability, help to develop this pride. They help to make your students better craftsmen.

The Irwin Auger Bit with Mainbor Cutting Head has been designed for manual training and industrial arts classroom work. A special set of thirteen Irwin Bits ranging in 16ths of an inch from 1/4 inch to 1 inch will help make your job easier.

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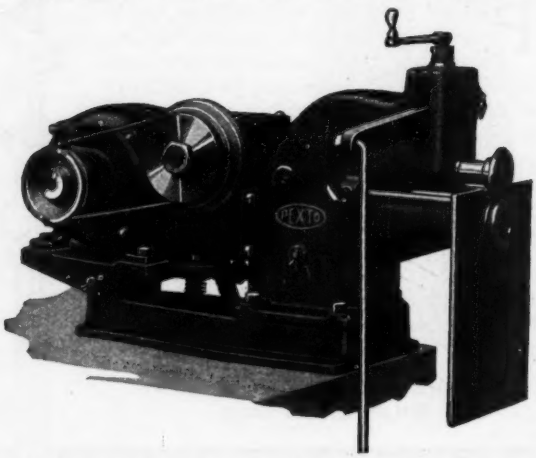
SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW UNIVERSAL COMBINATION ROTARY MACHINE

The Peck, Stow and Wilcox Company of Southington, Conn., has announced a new universal combination rotary machine for use in sheet-metal shops. The machine, complete with motor, requires only a minimum amount of space on the floor and weighs only 105 lb. It is equipped with a ⅓-h.p. motor and also with step-cone pulleys and



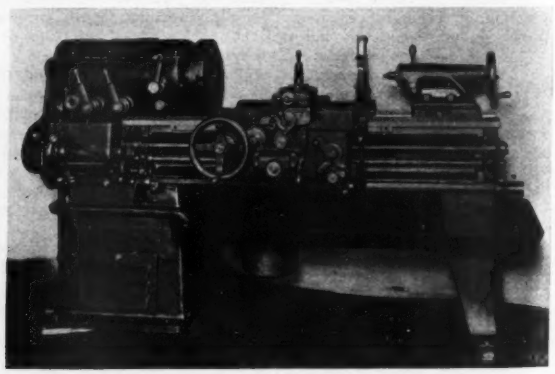
roll shafts which are capable of running 50, 75, and 100 r.p.m. The machine can be used for turning, burring, wiring, beading, elbow edging, and collar edging No. 22 gauge soft steel. Its capacity for crimping is No. 24 gauge steel, and for cutting, No. 20 gauge steel.

A well-illustrated four-page circular entitled "Just Plug it in" describes this new machine in detail.

ANNOUNCE NEW MODEL GEAR-HEAD ENGINE LATHES

The Reed-Prentice Corporation of Worcester, Mass., has announced the marketing of its new model 14-in. and 16-in. sliding gear-head engine lathes, which are intended for maximum production and utmost accuracy for toolroom purposes.

The machines represent the first of a new line of engine lathes, the smaller sizes of which should prove of interest in the educational field.



They are provided with a silent, smooth, and powerful sliding-gear transmission, nine gears for varying spindle speeds, splash lubrication and sight oil-level gauge, an easy-reading cast-bronze index plate, a precision Timken mounting, a "twin disc" clutch and brake for starting and stopping of the head spindle, a quick-change gear box for providing changes of feeds and threads, a cross-feed screw provided with

(Continued on page 35a)

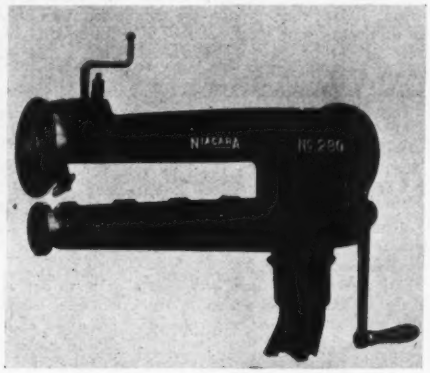
(Continued from page 32a)

a micrometer collar, a two-bolt type of tailstock with lateral adjustment for taper turning, and an apron with interlocking device for preventing the engagement of feeds and threads at the same time.

The machine is obtainable also with motor mounted within the head end cabinet, and either belt or chain-connected types of drive are available. A constant speed, 1150 or 1200 r.p.m., motor of 2 or 3-h.p. capacity is recommended.

NIAGARA DOUBLE SEAMER

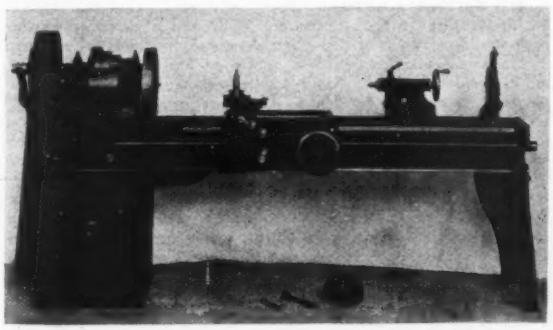
The Niagara Machine & Tool Works of Buffalo, N. Y., has recently placed on the market a new double seamer (Moore's type) for seaming the bottoms of cylindrical containers. The machine



is known as the No. 280 Niagara Double Seamer and has a capacity to double-seam soft steel up to 24 gauge. It has a sturdy one-piece frame and the working parts are large enough to give it long life. The gears are all inclosed assuring the safety of the operator.

NEW TYPE OF MOTOR DRIVE FOR SEBASTIAN LATHES

The Sebastian Lathe Company of Cincinnati, Ohio, has announced a new type of motor drive for cone-head lathes, which is applicable to all sizes but the 11 to 12-in. machine.



The motor is built in the leg under the headstock and the operation of starting and stopping is controlled through a friction pulley controlled from the apron. The adjustment of the belts is obtained through a handwheel at the front of the lathe. A belt guard of cast iron is provided, which effectively takes care of the safety feature. The bracket, which is on a line with the cone headstock, is so placed that it does not interefere with vision or light while the lathe is in use.

The lathe contains the same features regularly used on the Gold Seal lathes, with the exception, of course, of the special features embodied in the geared-head machine.

ISSUE NEW POST CATALOG

The Frederick Post Company of Chicago, Ill., has issued the fourteenth edition of its catalog devoted to drawing materials, equipment, supplies, and engineering instruments for technical schools, trade schools, and school shops.

The catalog contains 356 pages illustrating and describing such items as drawing paper, tracing cloth, blue-print paper, primo sepia solar paper, blue-print frames and machines, profile papers, cross-section papers, engineers' field books, drawing instruments, scales, slide rules, pantographs, drafting machines and accessories, protractors, planimeters, triangles, lettering angles, dividers, straightedges, T squares, splines, curves, drawing boards and stands, drawing tables, filing cabinets, draftsmen's stools, and a variety of miscellaneous drawing supplies and materials.

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Drawing Instruments & Materials

(Continued from page 31a)

A Progressive Chart in Printing. Mr. J. D. Rudolph, instructor in printing at the State Normal and Training School, Oswego, N. Y., has designed a progression chart in printing for use in the printshop of the school. The form of the chart was set and printed by Mr. Wilton Colman, and the explanatory matter was written by Mr. Phillip Bull, students in the industrial teacher-training department, under the direction of Mr. Rudolph.

Across the top of the chart are spaces for listing in topical form, the sequential steps of the course of study which each pupil is expected to complete in the order given. Preparation of the topics is based on a trade analysis, and the details of analysis, additions, or revisions, are made by the instructor to suit the needs of his particular problem. The trade groups are subdivided into their component unit operations, and these, in the order of progression, form the basis for the list of checking points tabulated across the chart under the trade group headings.

The related work is analyzed and listed in a similar manner. The subject headings are not absolute, but merely indicate the possibilities in this direction, the choice of topics being guided by the social requirements of the class.

The chart is coordinated by the class roll, which appears in its natural place at the left. Since the arrangement provides a combined course of study-and-progression chart, it may be amplified by horizontal extension to include the daily-attendance record and the distribution-of-work chart as well, thus combining most of the instructor's routine bookkeeping.

The usual colored pins used with charts or maps are employed to indicate the various grades suited to the established marking system. In this way, the position and color of a pin show at a glance, the quality and quantity of a pupil's work. It also facilitates the task of averaging at the end of a term to prepare the final grades.

The chart may be mounted on linoleum or similar material, which will admit the placing of pins to indicate the progression of the pupils through the course. The mounted chart should be placed in a glass-inclosed cabinet which can be locked up.

Yates-American Instructor Magazine. The Yates-American Machinery Company, Beloit, Wis., has announced the publication of the first issue of the Yates-American Instructor, a magazine devoted exclusively to the woodworking instructors of the country. The magazine contains up-to-date articles by well-known leaders in vocational work, a number of practical projects, questions and answers, shop layouts, and news about recent installations of Yates-American woodworking machinery.

The magazine is edited by Mr. Frederick O. E. Raab, of the Boys' Prevocational School, Rochester, N. Y., and is published by the educational department of the Yates-American Machinery Company.

The initial issue contained an article on Making Artistic Furniture, by Frederick O. E. Raab; Cabinetmaking, by H. B. Wood; Vocational Education, by James A. Kipp; and Woodworking as Taught at Oswego Normal School, by Mr. Schneider.

November Examination for Placement Aid. The board of examiners of New York City has announced an examination to be held in November for men and women applicants for licenses as placement and investigation assistants in high schools. The salary schedule for the position ranges from $1,500 to $3,000. The duties are to keep record of pupils who desire employment; to keep records of graduates and their vocational aptitudes; to visit commercial and industrial plants with a view to placing pupils who desire employment; and to make such personnel studies as may be necessary for employers in industrial and mercantile plants.

The written examination will include a knowledge of English, office practice, the duties of a placement secretary, knowledge of the laws and conditions affecting the employment of minors.

Complete information regarding the examination may be obtained by writing to the board of examinors of the New York City schools.

New Teaching Positions in New York City Schools. The budget request of the New York City board of education provides for the employment of 850 new teachers who are awaiting appointment from the regular eligible list of the education department.

In the vocational schools, allowance has been made for only three new positions. Among the new positions in the school system for which funds have been provided in the 1929 budget are five industrial teachers, 32 for shopwork, and 53 for homemaking to be opened in the fall in the elementary schools. In addition to these, there will be positions for one placement assistant, one machine-shop assistant, and one vocational teacher for boys.

Clinic for Crippled Children at Madison Vocational School. An orthopedic clinic for crippled children was held recently at the Madison Vocational School at Madison, Wis. Dr. H. C. Schumm was in charge of the clinic, which was held under the auspices of the Dane county committee of the Wisconsin Association for the Disabled. The children who attended the clinic were selected and brought to the vocational school by Miss Marguerite M. Lison, director of the department of special education for crippled children in the state education department.

(Continued on page 39a)

(Continued from page 36a)

Announce Examination for High-School Trade Teacher. Announcement has been made of an examination to be held in New York City in November for applicants who desire to teach industrial subjects in the city high schools. Ten subjects are included in the examination program, which embraces electricity, architectural drawing, electrical construction, forging, gas-engine mechanics, automobile repair, industrial processes, instrument making, machine design, milling and building construction, and sheet-metal work. The salaries attached to the position range from $2,148 to $4,656. Applicants are required to meet the following qualifications:

1. Graduation from a college or university recognized by the regents of the University of the State of New York, together with one of the following:

a) One hundred and sixty days of experience in teaching in secondary schools or in colleges, satisfactory to the board of examiners.

b) Three hundred hours of post-graduate work in the college or university, including sixty hours in methods of teaching the subject or subjects in which the applicant seeks license, unless courses equivalent to such sixty hours were successfully taken during the senior year of the undergraduate course, in which case only 240 hours of postgraduate work shall be required.

c) Any combination of satisfactory graduate work and satisfactory experience described in subdivisions *a* and *b* on the basis of the equivalency of 300 hours of graduate work and 160 days of satisfactory teaching experience in high schools.

d) Two years' experience in teaching in grades of the last four years of the New York City elementary schools, and the completion of university or college postgraduate work amounting to not less than 150 hours, 60 hours of which time shall be devoted to methods of teaching in the subject in which the applicant seeks a license.

2. Graduation from a normal school or city training-school course approved by the state commissioner of education; five years' satisfactory experience in teaching, including either one year of teaching in grades of the last two years of the New York City public elementary schools, or two years of teaching in secondary schools other than the public high schools, and the completion of satisfactory university or college courses in the subject in which the applicant seeks a license, amounting to not less than 150 hours, at least 30 of which shall have been in the science of education.

3. A general education and six years' experience in shopwork, of which at least 160 days shall have been devoted to class teaching in the subject in which the applicant seeks a license.

4. Applicants for license to teach vocational subjects and sciences in their application in industries must have the following qualifications:

a) A general education satisfactory to the board of examiners and six years' practical experience in the subject to be taught.

b) Graduation from a high school or an equivalent academic education, the completion of a two-year day industrial teacher-training course and three years' teaching experience; or

c) Graduation from a high school or an equivalent academic education and five years' journeyman experience in the subject in which the applicant seeks a license, together with (1) 480 hours of approved industrial teacher-training work or (2) the completion of an approved one-year day industrial teacher-training course; or

d) Graduation from an approved four-year college course in engineering or architecture, together with 480 hours of approved industrial teacher-training work, which may have been concurrent with the college course; or

e) The completion of two years of approved work in a college of engineering or architecture, two years of practical experience in the subject in which the applicant seeks a license and 480 hours of approved industrial teacher-training work.

New York State Conference of Vocational Heads. A conference of the New York state directors and supervisors of vocational education was held during the summer session at the New York State Normal School at Oswego. The conference was intended to help those responsible for the professional improvement of vocational teachers in the service. The conference was attended by directors of vocational education in city schools and by principals of vocational schools throughout the state.

Special lectures were given each day in connection with the round-table discussions.

The conference was part of the general program of the state education department in the training of vocational teachers in service.

Training of World-War Veterans Ends. The educational phase of the rehabilitation of world-war veterans came to an end on July 1, according to information received from the government offices at Washington. The statistics department shows that 128,500 men were trained with the purpose of making them self-supporting. The government provided vocational training for men rated with a disability of 10 per cent or more. Besides paying for tuition and books, it gave $100 a month to single men and $135 to married men, with additional allowances for dependents. Of the 334,494 who applied for training, 216,431 were rated as entitled to full courses. A large number of courses were offered in a large number of schools. The government estimates the cost of the service at more than $600,000,000.

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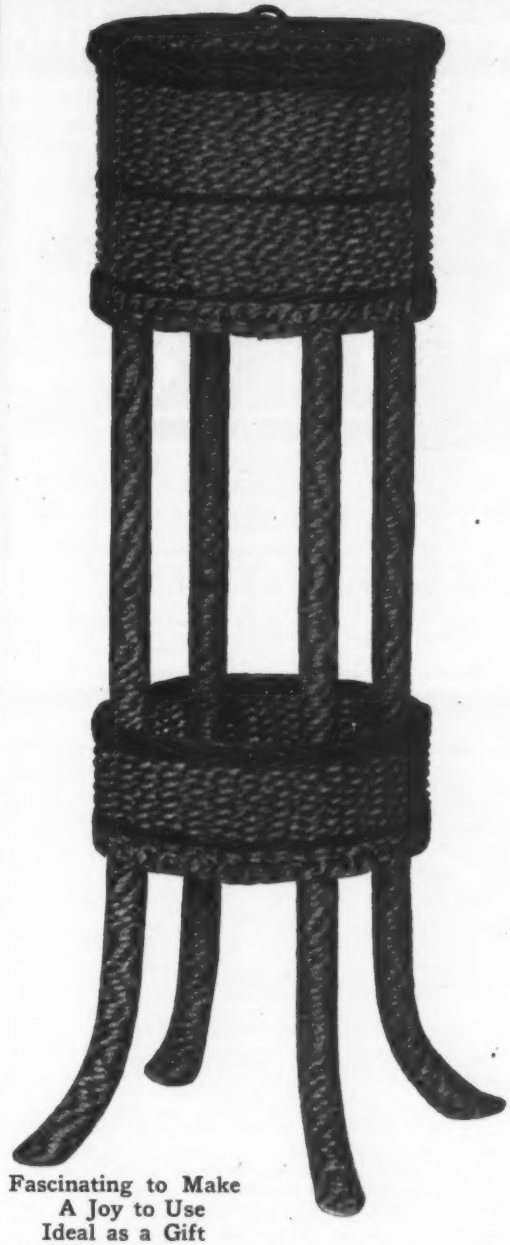

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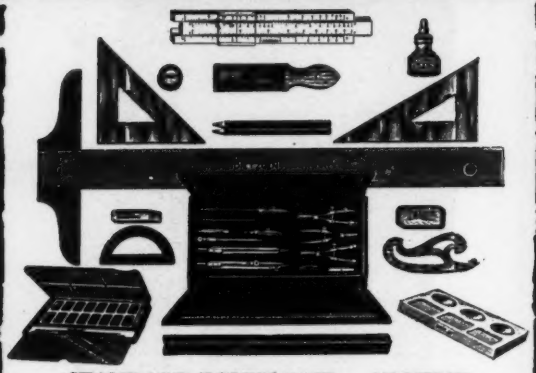

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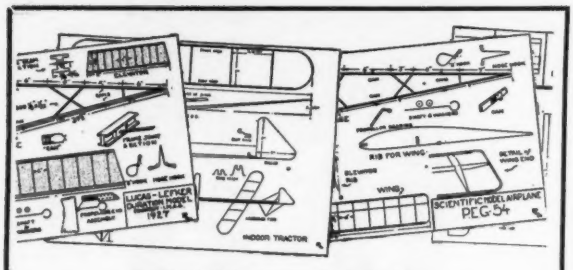

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Reed, 6"lengths, 1/16" diam., .05¢; 1/8", .075¢; 1/16", .10¢.
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Ambroid cement, 2 oz., .33¢; 4 oz., .53¢.
Bamboo paper, 13" x 36", .12¢; 24¾" x 33¾", .14¢.
Rice paper, 18" x 24", .09¢; 21" x 25", .06¢.
Wood veneer, 20" x 30", .22¢.
Flat rubber, 50' of 1/8", .50¢; 50' of 1/16", .75¢.
Piano wire, 3' of No. 5 or No. 8, .04¢; 3' of No. 11 or No. 15, .06¢.
28-30-32-34 steel wire, per spool, .10¢.
1/16" copper washers, 10 for .05¢.

We can supply any size.....balsa that you need, also propellers, I beams, wing sections, bolts, nuts, screws, brads, aluminum, brass tubing, turnbuckles, and books on model building.